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EDITORIAL NOTES—GAS, &c.

The Industry's Memorial to Sir George Livesey.

THOSE present at the special meeting held on Thursday, under the chairmanship of the President of the Institution of Gas Engineers (Mr. Thomas Glover), to consider the question of a memorial by the gas industry to perpetuate the memory of Sir George Livesey, were unanimous in voting that such a memorial was desirable, and in pledging themselves to give active support to the movement. This resolution, however, was purely a formality, as no one could possibly have been present on such an occasion who was not in full sympathy with the project. Actually the only question for discussion was the form the memorial should take. There were four suggestions before the meeting. But only one—that of the endowment of a Chair of Gas Engineering and Fuel at the Leeds University—was vigorously advocated. There was a great deal of sympathy with the scheme for a central home for the gas industry; but the points in favour of such a home, from the aspect of utility apart from appropriateness as a memorial, were not duly weighed against the objections that were advanced. The studentship scheme did not commend itself; and the fourth scheme—the endowment of the Institution with a fund for research purposes—was barely touched upon, and for more than one reason.

In thinking over these schemes, as Mr. Corbet Woodall pointed out, we must not forget the memorial idea; and to this must be added the idea that a memorial to Sir George (who, in all the walks of his life, was insistent that money should only be spent for a good purpose) from the industry should be of a nature that will render the greatest amount of value to the industry as a whole. And we do think that this point of view was thoroughly kept in mind by the meeting; and that the issue of the deliberation is the one that will, after our full report of the discussion is perused, command the respect and material support of every individual, corporate concern, and manufacturing firm comprising our large industry. If, in the consideration of this matter, all who were not present at the meeting will keep in their minds the question of the relative usefulness to be derived by the industry as a whole from the schemes while carrying out the primary object, there will not be any further questioning of the matter, though it may mean (as in our own case) the sacrifice of the original choice.

Consider briefly the projects submitted in the reverse order to that set forth above. The proposition to endow the Institution with a research fund we hardly thought would commend itself—at all events, experience does not suggest that it would be very favourably regarded. There is nothing sufficiently definite, so recent history assures us, about the application of such a fund to draw the necessary number of subscribers; and, in relation to it, the Council can do little more than order its disbursement and direct as to the character of the work to be undertaken. Good as this is in a way, it does not (and we are sorry to have to say it) attract any large support. Besides, the Council have not themselves the facilities for vigorously prosecuting such work; and it has perforce to be mainly delegated to others. Therefore, in considerable measure—though not entirely on the manufacturing side—research work, and well-ordered research work, can be better conducted through a specially equipped and constantly active centre such as is presented by the Leeds University, with its talented specialists whose studies and lives are devoted to the unearthing of scientific truths bearing largely on the practical work of industry, and the efficiency of industry's productions. As to the studentships, looked at from the industrial standpoint, this proposal, if it had been adopted, would have had a limited industrial, though perhaps a largely personal, value; and, as was suggested, there would have been no guarantee that the young men gaining studentships and benefiting from the fund would, in their later life, have devoted themselves to the service of the gas industry. But in connection with this question of studentships, there was an excellent suggestion thrown out by Mr. J. Horsley Palmer, the Chairman of the Imperial Continental Gas Association and of the British Gaslight Company, and whose active interest, we are unfeignedly glad to see, has been evoked by this movement to perpetuate the memory of Sir George. It was that, if the studentship scheme had been adopted, some of the money might have been devoted to giving successful students an opportunity of travelling abroad to see what is being done at Continental gas-works, especially German ones. The suggestion even now may be borne in mind as a suitable method of conferring reward for distinction—if funds will admit.

Then we come to the question of the home for the gas industry in London. This is no new project; and it was largely and influentially favoured, until the question of usefulness to the industry generally—gas supply and manufacturing—was considered in all its bearings. It must not be forgotten—and this is a point that was at first overlooked by us, and has not been recognized by many others—that this is to be an industry's, and not merely an engineers', memorial to Sir George. The distinction is great. A home that would have been particularly devoted to the work of the Institution would not have given that same feeling of a common participation and common possession that work will do, the fruits of which in knowledge and advance all in the industry will enjoy. However, many were before the meeting on the balance between the "home" and the Leeds University scheme. Of 50 letters received prior to the meeting, 27 generally expressed approval of a memorial, eleven were in favour of a home for the industry, and six expressed a strong feeling in favour of a Livesey Professorship of Gas Engineering and Fuel in the Leeds University. The senior Vice-President of the Institution (Mr. James W. Helps) was responsible for putting the "home" scheme forward on this occasion; but at the same time, he reserved the right of final determination until after discussion. Mr. H. E. Jones, too, though opposed to the scheme now, was in June, 1904, in his Presidential Address to the Institution, strongly in favour of it—making on the occasion no less than three allusions to it. Reference to these shows that some of his arguments on Thursday against a home for the Institution have their answer in his prior utterances. But he, like many others, was largely influenced by Mr. Helps' report on a visit he had paid to the Leeds University, by the leading advocacy by Mr. Corbet Woodall and Mr. Charles Carpenter of the Leeds University scheme, and last, but by no means least, by the estimate of £20,000 mentioned by the President (Mr. Thomas Glover) as the cost of a site and building in London. This alone is a hopeless expense to be discharged solely by invited contribution, and will continue to be so until some would-be benefactor of the gas industry earmarks a portion of his wealth for this particular purpose.

However, from what has been said, it will be generally conceded that—from the points of view of utility, cost, and appropriateness in view of all and sundry connected with the gas industry being invited to subscribe—the Leeds University scheme is the best of all the proposals; and that is the reason for its adoption without any dissentient vote at the meeting. The question has crossed more than one mind as to whether the Leeds University is the best place for such an endowment. But a little consideration will provide the affirmative answer. Among the universities where the study of pure science in its application to industry is prosecuted, it is the one that, during recent times, has equipped a department specially for the purpose of serving by research, and giving the necessary technical foundation to men upon which to build practical work in, the gas and other fuel producing and consuming industries. There is a minority who have questioned the belief of the majority that the influence of properly directed research work is incalculable both to the gas-supply industry and to the manufacturers who work for the industry. But now, by slow degrees, the minority are

beginning to see the error of their ill-considered judgment. We cannot have too much of such investigating work in the interests of advance, and more especially with competitors pressing for the capture of ground in the possession of the gas industry. Great and admirable progress in curtailing costs and increasing efficiency has been made by those competing industries; and the continuous assistance of Science is needed to enable us to maintain our lead, whether through economical production or improvement in the means of utilization. And the research work that is being done at the Leeds University, and the men to whom the University gives special training, will instigate hereafter to still greater activity (as Mr. W. R. Herring suggested at the meeting) in inquiry, and in proving results, in the many other universities, technical schools, and gas-works of the country. The product of the research work of the Department of Gas Engineering and Fuel will be common property; and this disposes of the fear that the scheme for the endowment of the Professorship of Gas Engineering and Fuel will, in its profitable effects, be largely confined to Leeds and the neighbourhood. So far as the authorities of the Leeds University are concerned, there may be complete certainty that they will always be loyal to the claims and interests of those who are now showing such a signal mark of their confidence in the University. It is known that Professor Arthur Smithells has had a great deal to do with the establishing of the department; and he voluntarily gives, through us, to the gas industry—though not needed—an assurance that he will do everything in his power to see that the department established by the industry is made as serviceable as any such department can be to the needs of the industry.

Nothing more we feel sure need be said to recommend the decision that was arrived at on Thursday. Every gas company with a fair name, every local authority owning gas-works, and every individual in the gas industry, are asked to subscribe according to their or his means. There is not one engaged in the gas industry who has not benefited in some way by the ever-alert mind of, and the keen, far-reaching work performed with an absolute self-abandonment by, Sir George Livesey. Therefore, let each one give; and, as Mr. Woodall urged, do not let the grace of the act be tarnished by the necessity for repeated appeal. The nucleus of the fund, it is hoped, will be provided by those who are now subscribers to the Department of Gas Engineering and Fuel commuting their annual contributions. There is one point that will be interesting to those who were not present at the meeting. It has been arranged that there shall be a Gas Advisory Committee appointed to work in conjunction with the Council of the Leeds University; and in this connection it may be suggested that the Advisory Committee should have upon it one member appointed by the Council of the Society of British Gas Industries to represent the views of the members of that body, and therefore of the gas plant and appliance manufacturing sections of the industry. There is another point. It is a condition informally endorsed by the meeting that the fund itself shall be retained in trust by the Institution of Gas Engineers as being the chief representative organization of the gas industry; and that is an arrangement that will meet with the approval of the contributors. Nothing now remains but to contribute; and let it be done, remembering the object, generously and promptly.

Right to Shareholders' Lists—An Appeal.

THE decision of Mr. Justice Warrington in the case of *Davies v. The Gaslight and Coke Company* will not, we are pleased to learn, be taken as finally disposing of the matter of the supply of lists of the names and addresses of shareholders to persons who qualify for the sole purpose of obtaining them for enabling them to prosecute their company-promoting and capital-raising businesses, in connection with ventures of a more or less doubtful character. A stay of execution has already been granted to the Company; and an application for leave to appeal will be made to-morrow. Meantime, Mr. H. D. Ellis, the Secretary of the Commercial Gas Company—of whose intimate knowledge of matters affecting Company law there has been evidence in times past—has raised what, so far as we can trace, is a totally new consideration as to the questions of privilege and interpretation; and while not presuming to endorse, or to categorically dissent from, Mr. Ellis's submissions (these being distinctly matters for legal argument and adjudication), we do say that he has presented points in the article appearing in subsequent columns that deserve, and will undoubtedly receive, very serious attention by the advisers of the Gaslight and Coke Company, and by those Companies interested in this matter whose capital is now represented by stock and not by shares. Where with all respect Mr. Ellis thinks that Mr. Justice Warrington is wrong in his decision is in treating the plaintiff Davies as a shareholder and not as a holder of consolidated stock, and in treating the "Register of Addresses of Shareholders" as a "Register "of the Addresses of Stockholders" for which the Act does not stipulate. In fine, his contention is that in this matter of obtaining lists of shareholders' names and addresses, there is a deliberate distinction drawn by the Companies Act of 1845 between shareholders and holders of consolidated stock, and that there are positively drafted provisions relating to the question.

In section 9 of the Act, provision is made for the keeping of a "Register of Shareholders," and in section 10 for the keeping of a "Shareholders' Address Book;" and it is only this latter (and not the former) book of which a copy can be obtained by a shareholder on payment of a sum not exceeding 6d. per 100 words. If we turn to sections 63 and 64 of the Act, reference is made to the keeping of a "Register of "Holders of Consolidated Stock," but nothing is said, as in section 10 referring to "shareholders," as to keeping a register of the addresses of the holders of such consolidated stock. And, moreover, section 63 only provides for the "Register "of the Holders of Consolidated Stock" being "accessible" at all seasonable times to the several holders of shares or stock. It will possibly appear to readers on first sight that section 64 of the Act points to something that vitiates Mr. Ellis's contention, in that upon the holders of such consolidated stock are conferred "the same privileges and advan- "tages, for the purpose of voting at meetings of the Com- "pany, qualification for the office of Directors, *and for other* "*purposes*, as would have been conferred by shares of equal "amount." But opposed to this is the before-mentioned fact that, while a "Register of Holders of Consolidated "Stock" is provided for, the provision of an "address book" of such holders is not specified. It is quite inconceivable that the "accessibility" that is clearly allowed to the former book under section 63, can be construed to mean all that section 10 confers; and, if it did, a copy of a register of the stockholders without their addresses would not be of much service to company promoters for the circulation of prospectuses and invitations for applications for fresh capital. Several pertinent points are made by Mr. Ellis in his suggestive article; and after duly weighing them, many readers will concur that such definite discrimination in terms as is found in the four clauses in question of the 1845 Act cannot be attributed to any mere accident in drafting. Even if the point were submitted to the Court of Appeal, and it was decided that there was no fracture in Mr. Ellis's net, those companies whose capital is divided into shares would still be exposed to the claim to a privilege that has been the means, through the operations of certain company promoters, of causing much annoyance to *bonâ fide* investors in gas companies, and involving the sinking of many thousands of pounds of their money in ventures that carry a load of capital that, without something miraculous occurring, can never yield a fair return.

Coalite Position—Gas the Dominating Factor.

ANOTHER chapter in the history of coalite was opened up to the waiting shareholders in the British Coalite Company, at their first annual meeting last Wednesday, by the Chairman, Mr. Albert G. Kitching. It is quite clear from what he said that it was a case of premature birth with this Company; and that much of the grandiloquent language employed over the process as a *soi-disant* technical success at the time appeal was made to the public for capital, was untrue. Talking of capital, a large part of the time of Wednesday's meeting was taken up with the discussion of the financial relations of the British Company with the parent Coalite Syndicate, who were "let in" very heavily for shares of the former as underwriters, and whose foreign patents are now held in pawn by the British Directors as surety, with a big batch of deferred shares, for the due performance of their obligations. But with these financial difficulties we have not much concern, except in so far as they are the indications that a public big (it is understood) with impatience for coalite are still extremely shy of coalite as a satisfactory commodity in which to invest capital. In this connection, the secret of

the advertisement articles in "The Times" and elsewhere is now out. The Board of the British Coalite Company disown them. Coalite Limited are about to ask the public for more capital, part at any rate of which is to go to liquidate the arrears of interest on the money owing to the offspring. What is more, the British Company have nothing worth speaking about yet in the way of product for sale; and therefore they have nothing to advertise. The condition of their works, too, and other considerations attest the fact that the time is yet far off before they will be in a position to turn out coalite and bye-products in sufficient quantity to make any real return upon their three-quarters of a million of capital. The speech of Mr. Kitching leaves no room for doubt that success depends upon several eventualities over which the much-vaunted "patents" and the great superiority of coalite among the fuels cannot exercise any control. It must be said for Mr. Kitching that, while the spirit of confidence animated his financially trained mind regarding the technical and commercial value of what the Company now possess, he did not altogether ignore the practical difficulties confronting, nor did he allow himself to ascend into those celestial realms in which were indited the latest series of coalite advertisement articles.

Much has happened during the fifteen months since the shareholders last met; and much has yet to happen before coalite can, if it ever does, yield a return to those who have invested money in it. Now what has happened technically in the past year. Principles we are told remain; the only one—looking at the matter from a distance—that we can find remaining is that of the use of a relatively low temperature in carbonization. The carbonizing plant itself has undergone radical change. Yet it was at the very apex of perfection—on paper—when the Company was floated. The old flat box kilns, and certain of the other impediments to facile working, which gave a remarkable hypothetical excellence to the product, have been cleared away; and there has been a long stride in recent months towards the simple methods of the gas-works engineer—low temperatures being still retained. In carbonizing, time has been saved, and economy achieved. But what are the carbonizing structure and system now? Simply "bunches" of twelve 5-inch diameter iron retorts, cast in one batch, set up vertically, charged intermittently—every three hours now; and the partially spent charges expelled direct on to a conveyor, and there quenched. What are the differences between this working and the intermittent working of vertical retorts in gas-works, save only the lower temperatures, a normal shorter hour working, and the use of iron retorts (a revival of a discarded practice) instead of fireclay ones? We fail to see any other difference; but perhaps the future will bring greater enlightenment. If the Directors had gone on erecting coalite carbonizing plant as it existed at the time capital was extracted from the public, it is confessed there would have been by now big scrap-heaps at Barking and Wednesfield. Mr. Kitching seems to encourage the belief that all the Company have to prove is that low temperature carbonization is the correct thing to bring gas companies and committees throughout the country on to their knees before them. Let him not deceive himself. It is just as easy for the gas companies of the country to bring down their temperatures to 800° with their present plant as it is to use that temperature to heat up a solid mass of metal containing twelve 5-inch boreholes, and produce coalite, the superior tar, and only 5000 cubic feet of a high (according to the quality of the coal) illuminating power gas. But the high quality of gas is not now wanted, the demand for coke of the character of coalite is not notoriously extensive, and the secondary products of the higher quality tar shift the Company into a keenly competitive field. It is not low-temperature carbonization that has to be proved; it is the commercial value of the resultants of this low-temperature carbonization. Until this is done, gas companies will not be disposed to jeopardize their dividends for an uncertainty such as is submitted in this process.

The installation of coalite plant at the Plymouth Gas-Works, which is to produce ½ million cubic feet of gas a day, and about 100 tons of coalite, is the one that is going in the belief—and it is really the sincere belief—of the non-technical heads of the Company (we do not know what Professor Lewes's innermost thoughts are on the point), to convict gas undertakings of the error of their carbonizing ways. Let us suppose—though our imagination has not attained the flexibility that permits the supposition to assume the shape of a possible actuality—that the installation does prove that the antithesis of present gas-works carbonizing practice is the best thing. Even then there would be no need for gas-works to utilize the coalite plant; and no one knows this better than does the Board's technical adviser. We shall be sorry if the Board of the British Coalite Company, through any want of knowledge of these matters, should at last find that they have been living in a Fool's Paradise. That is why there will be some amusement rather than resentment in the gas industry over the Chairman's announcement, uttered with all the gravity at his command, that no other gas company need apply for the provision of plant on the same terms as the Plymouth Gas Company have secured the small installation there, and which terms the Plymouth Company insisted upon, as has been pointed out in these columns, on the excellent mercantile principle (which is also occasionally adopted by City financiers): "Heads I win; tails you lose."

But if there is critical examination of other parts of the speech from the chair, it is seen that the commercial success of the system is not dependent on low-temperature carbonization, but on circumstances that are more or less beyond the control of the Board of Directors, and which rests largely in the hands of others—for instance, in the hands of the British gas industry. Let us put the Chairman right on one point. There is not the deep-seated friction that Mr. Kitching imagines between gas undertakings and the Coalite Company. The gas industry merely believes that the Coalite Company are wrong in their fundamental proposition, and that their practices will not suit the primary and commercial objects of the industry. The experts of the industry are not, therefore, going to abandon the experiences of a century or more at the summary behest of inexperience and of dogmatism. That is all; nothing more. We have to confess, too, to ignorance as to what the Chairman means by his remark that the coalite process would give the gas industry cheaper and purer gas. The cheapness of coalite gas, beautifully shown in Cantor Lectures and in advertisement-articles, is subject to so many speculative elements that gas undertakings will long prefer the revenue from (say) 12,000 cubic feet of gas per ton in the sale of which within the limits of supply they have no competitors, than look for their main revenue per ton of coal handled to sources that will be subjected to the keenest of competition, to the vagaries of supply and demand, and to new invention. As to purity, their gas now complies in all respects with statutory requirements. Of this we are sure, that the success of the coalite concerns is dependent on the goodwill of the gas industry. Coalite must have centres of manufacture and distribution in every town, if conveyance costs are not to kill the sale of coalite. And the centralized production of coalite cannot be carried on effectually, inasmuch as the disposal of the gas for a monetary consideration is a *sine quâ non*.

These are among the disturbing factors that lie hidden in the backs of the minds, and behind the facial and lip confidence, of the Directors; but the Chairman could not quite conceal them, as quotations will show. "When the friction "between them and the gas companies had disappeared " . . . they would attain their desire of gaining centres "of production for coalite throughout the country." As to the utilization of the gas, he said: "It was clear therefore "that until the improved installations could be erected *and* "*the gas utilized*, it was far better in the interests of the "Company to devote the time to the work of standardizing "and perfecting the plant, and erecting it *only as quickly as* "*work could be found for the gas*." In giving reasons again why the Barking site has not yet been developed on the large scale, he said: "There being no outlet for the utiliza-"tion of the gas produced, it would have had to be blown "to waste—a procedure which would have cost the share-"holders many thousands of pounds, and coalite, under "these conditions, could only have been made at an in-"finitesimal profit." At Wednesfield, the gas is being used for the generation of electricity, which in turn is employed in the manufacture of ferro-silicon, in electric furnaces, and in electrolytic processes. But how far can this be carried to yield "large profits"? At Barking, the Company have lost what they had hoped for—the outlet for the gas in the generation of electricity under the power-and-bulk scheme just rejected by Parliament; and they are not going to do anything so absurd in the coming session as to ask for sanction to a power-gas scheme in East London. We have seen, on the Chairman's own confession, that it is no use erecting large works at Barking, unless there is a profitable outlet for the gas; and the only scheme the Company can think of at

the present time is to invite manufacturers to put up factories there, and use the gas for power purposes. But what a lot of factories would be required to utilize the gas when the fuel of London is all coalite! We are afraid there is here the presentment of a forlorn hope; and that the shareholders are saddled with a scheme that is destitute of the practical elements necessary to financial success. All that the Company are doing this season is to produce sufficient coalite to keep interest in it alive. All they will do in the future is to produce just as much coalite as the market for their gas will enable them to do. It is quite clear from the Chairman's statements that gas dominates the position, and not motor spirit, solvent naphthas, disinfectants, carbon-free pitch, or liquid fuel—all of which will enter a highly competitive field. It is something worth special acknowledgment that the Chairman of the British Coalite Company does not completely, in his enthusiasm, turn his face from the practical disabilities of the coalite system. One of the duties of a Director is to prevent waste, or further waste where there has already been much.

Unaccounted-for Gas.

THE valuable paper, reproduced on another page of to-day's "JOURNAL," which was presented by Dr. W. B. Davidson, the Chemist to the Birmingham gas undertaking, to the meeting of the Midland Junior Gas Engineering Association on Saturday, is well deserving of special attention. It deals with various aspects of "Measuring, Testing, and Record-"ing," but is more particularly suggestive in regard to unaccounted-for gas. In fact, if the latter expression is taken in a broader sense than that to which it is commonly restricted by gas engineers, and is applied to unaccounted-for shortages of gas on either side of the station meter, it will be seen that Dr. Davidson's communication throughout bears more or less on the topic. In this broad sense, there is a shortage of gas when carbonization is imperfect, when ascension-pipes have to be cleared, when condensation is badly conducted, and generally when there are indifferent conditions of working prior to the admission of the gas to the station meter. Dr. Davidson's remarks on the value of, and the necessity for, accurate measurement, weighing, and testing apply directly to the discovery and locating of such losses, and are worth careful perusal in that connection.

With this commendation to our readers of his paper as a whole, we may pass on to a fuller consideration of his views on unaccounted-for gas in the ordinary limited application of the term. At the outset, it has to be borne in mind that the station meter at best merely affords a record of the passage of gas according to its volume at the temperature, degree of humidity and pressure to which it was subjected while within the meter. Unless the temperature, the degree of humidity, and the pressure of a gas are given, a mere statement of its volume is as vague in meaning as the term "lump" would be as a definition of the size of a mass of mineral matter. Unfortunately, however, there appear to be many cases in which the records of a station meter are constantly being applied without any regard to the conditions which determine the volume for the time being of a given quantity or mass of gas. Because these conditions are known to vary only within certain limits, their effect in varying the volume of gas is too often regarded as negligible. But it is worth the while of those who have adopted this view to consider with Dr. Davidson what may be the extent of such a variation of volume.

Brief consideration should certainly suffice to convince them that neglecting to regard the variation of volume of gas may lead to absolutely misleading records of make and loss of gas being accepted. The temperature of the station meter may conceivably range from 40° to 84° Fahr., and the atmospheric pressure from 28 to 31 inches of mercury, while the gas in the meter is always saturated with moisture. Within these limits, a make of 10,000 cubic feet per ton measured in one set of conditions would be recorded as nearly 12,500 cubic feet under another set of conditions. This is without regard to possible variations of the positive pressure at which the gas is driven through the meter. Now it is evident that if the same quantity of gas may be recorded as 25 per cent. more at one time than at another, the readings of the station meter are not forthwith applicable to the estimation of the make of gas per ton of coal, or of the proportion of gas unaccounted for on distribution. Hence the practice has been widely followed, and should be universally adopted, of correcting the records of the station meter according to the conditions prevailing at the time of reading the index, in order that the figures ultimately entered in the carbonizing sheets may represent the volume which the gas would have were it always measured under certain clearly defined conditions. These conditions, which may conveniently be spoken of as "normal," vary in different localities. In Great Britain, normal conditions of measurement, for (say) the make of gas per ton of coal, are that the gas should be saturated with moisture and at a temperature of 60° Fahr., and under a barometric pressure of 30 inches of mercury. On the Continent, other conditions are usually taken as normal. The main point, however, is not that one arbitrary set of conditions should be universally accepted as normal, but that all measurements of make or output should be corrected to their corresponding volume in some convenient set of conditions which should be clearly stated, and for the nonce may be regarded as normal. The change in volume which would occur if other conditions were established is then merely a matter of simple calculation. The essential is that it should be recognized that the readings of a station meter are meaningless or misleading unless the temperature and absolute pressure of the gas in the meter are known.

Dr. Davidson indicates that the practice of observing the temperature and absolute pressure of the gas in station meters is by no means so general as we had supposed it to be. Also, even when the observations have been made, incorrect factors are frequently used for converting the observed volumes of gas to the corresponding volumes in normal conditions. We think that, as a fact, he must have been singularly unfortunate in the directions in which he made his inquiries. We believe the practice of correcting station-meter readings by means of tabular numbers, such as those issued in the notifications of the Gas Referees, is fairly general in our larger gas-works. Assuming that such correction to the normal conditions of 60° Fahr. and 30 inches of mercury pressure is or becomes universal, the question arises how these conditions are related to the average conditions of measurement of the gas in the consumers' meters. Apart from the preponderance of the errors of the latter in one direction, for which it would be difficult to prescribe a suitable correction, there is uncertainty as to the average temperature of consumers' meters in either half of the year. Further, the atmospheric pressure is unlikely to be as high on the average of a district as at the gas-works, which are commonly in one of the lowest positions in the neighbourhood. In some cases—St. Gall, in Switzerland, for instance—the greater altitude of the district supplied may result in more gas being accounted for by the consumers' meters than apparently leaves the works. In nearly all cases, it is imperative, before deductions are drawn from the volume of unaccounted-for gas as to the extent of leakage in a distributing system, that a fair estimate should be made of the average temperature and pressure of the gas in the consumers' meters, as well as the volume of gas recorded by them corrected accordingly to normal temperature and pressure for comparison with the similarly corrected readings of the station meters. Unless this is done, absolutely wrong inferences may easily be made as to the extent of leakage. Dr. Davidson seems to think that the consumers' meters in (say) Birmingham on the average measure the gas at 45° Fahr. and an atmospheric pressure of 29·7 inches of mercury. Gas engineers who have collected data for other towns as to the average conditions in which consumers' meters work would render a service to their colleagues if they would make known the conclusions at which they have arrived therefrom.

The Ravenous Promoters.

Barely a week seems to pass now without Eaton and his confederates appealing to the public for more money, for one or other of their over-weighted concerns. A fresh appeal, circulated with prodigal hand last week, has been made for money in the Robertsbridge, Salehurst, and Hurstgreen Water and Gas Company, Limited, whose name is far more imposing than the business done. What is wanted now is £2400 in the shape of 6 per cent. preference capital; this being the balance of the unissued preference share capital in this poor little concern, which has not even a water-works of its own, but buys from another Company—the Ticehurst—whose fate it is to have to acknowledge the same parentage. The well-known names of Maclean and Jenkins—the one a barrister-at-law and the other a captain and a "D.S.O."—

are associated with the directorate of the Company. Eaton also takes a very kindly and fatherly interest in its welfare; for it is remembered that the last annual meeting was held at his Sussex residence. The new prospectus issued by these people is dated Dec. 5; and perhaps a few persons of mediocre intelligence will be found who will not be able to resist the sop held out in the first lines that meet the eye, that "the shares subscribed for, and allotted on this issue, will rank for dividend as from Sept. 29, 1908"—over two months after the issue is made. The ignorant investor is thus induced to start his perusal of the prospectus with warm-hearted feelings towards these benevolent persons, and will possibly forgive the innocent scheme for counterbalancing the generosity, and getting something to the good, by putting a 5 per cent. premium on to the issue of 480 6 per cent. preference shares of £5 each. This is how the capital of this pigmy concern will stand if this issue succeeds: The "authorized" ordinary capital has already been issued to within £80, by the allotment at various times of 1184 shares of £5 each, which represent £5920. The number of preference shares issued is 1718, representing a further £8590. If the whole of the preference shares now offered are allotted, with the 5 per cent. premium, they will represent £2520, which will bring the capital up to £30 more than the £17,000 authorized. In addition, there has been issued first mortgage debentures to the amount of £5000. To the present, therefore, the capital (with debentures) stands at £19,510; and, if the new issue succeeds, it will be (with the suggested premium) £22,030. Contractors who may be contemplating doing business with these Companies may be interested in knowing that some who have already carried out constructional works are the happy possessors of 400 £5 preference shares and 395 £5 ordinary shares in part payment for their contracts.

Reticence and Castles in the Air.

There are no definite figures in the prospectus. There never are in the prospectuses of this particular brood. Nothing is said about what has been done in the way of profit making and sharing; and no figures are given as to revenue or consumers. But with the stark effrontery of these people, they state in striking type that there has been an increase in the water revenue for the September quarter compared with 1907 of over £20 per cent., and an increase of £25 per cent. in the gas revenue. The craft in this statement needs no pointing, any more than does the prominent reference to the market value of the Hastings, Lewes, Tunbridge Wells, and Eastbourne shares. There would have been far more sense in quoting the market value of the East Sussex and Ticehurst Companies' shares. Black type also announces the consideration of a proposed amalgamation of the undertaking with another similar concern. We believe this refers to the East Sussex Company, which has not earned a reputation among the shareholders for its profit-yielding capacity. The audacity of these people, and the miserable character of the stuff they put forward as serving for sufficient recommendation to shallow-pated investors is seen in the following paragraphs of the propectus:

> An important factor in the outlook of the rapid growth of revenue is that the Company's works are in a favourable position to supply gas for power purposes for the neighbouring water-works, in which event the revenue would be considerably and largely increased.
>
> Negotiations have taken place with the South-Eastern and Chatham Railway, with the object of obtaining a siding (close to the work) for coal, which, if obtained, would place the Company in a favourable position to renew the proposal to the various outlying gas companies to provide at this Company's works a central gas manufacturing station, under which a considerable saving would accrue to the various gas companies on the one hand, and on the other a large business and profit to this Company, enabling (if carried out) this Company to pay its maximum dividend.

As to the first paragraph, most gas-works are in a favourable position to supply water-works with gas for power purposes—if required. As to the second paragraph, does this foreshadow a development of the schemers' plans, now that they have presumably got to the end of their capital-raising ability in connection with certain of their flotations?

A City Canard.

Rumours in the City have quick birth and rapid circulation. The "Stock Exchange Gazette" has captured one of these, to which it gives a large measure of credence. It is said that had it not been for Sir George Livesey's mental calibre, which was of a kind that could not, under any circumstances, sink its identity in favour of other intellects, the chances are that many years ago a fusion of interests would have been brought about between the Gaslight and Coke Company and the South Metropolitan Company—the object being reduced cost of production and administration. In these directions, it is said, great advantages would be secured. That is a matter upon which there would be very strong individual and divergent opinions in Metropolitan gas circles. But this is the point: Presumably (considering the premises) through the removal of Sir George's strong "mental calibre," it is believed, by our contemporary, "that recently proposals of this nature have been revived, and that the negotiations have reached a stage which renders their successful conclusion a matter of probability, and though the date may be some way off on which the Directors may be able to make a definite announcement on the subject, and in the meantime they may find it expedient to deny that any steps have been taken in the direction indicated, there seems little reason to doubt the accuracy of the rumours which are now in circulation."

Advice to Investors.

Mr. Winston Churchill, according to a statement made in the House the other night, has been issuing a memorandum for the protection of the poor and less instructed class of investors in companies doing business in house purchasing. In the memorandum attention has been drawn to certain definite points which, the President of the Board of Trade thinks, require the careful consideration of such investors. It would not be a bad thing if he would do the same for the poorer and less instructed class of gas investors. The statement as to what he has been doing was made in answer to an inquiry by an honourable member as to whether, in view of the fact that thousands of people have been deprived of their whole savings by such companies as the Provincial Homes Investment Company, he would take steps to have such companies wound up and the promoters prosecuted. It appears, however, from his answer, that companies registered under the Companies Acts, can only be wound up in the manner provided by those Acts; and the Board of Trade have no power to take any steps to obtain or order a winding-up. Nor is it within the province of the Board, except in the case of companies ordered by the Court to be wound up compulsorily, to take steps for the prosecution of the promoters. If anyone has facts in his possession disclosing a criminal offence, it is in his power to submit them to the Director of Public Prosecutions.

Continental Union Gas Company.

The statement that Mr. Arthur Lucas, the Chairman of the Continental Union Gas Company, laid before the shareholders at their meeting last Tuesday is one that will interest a larger circle of our readers than those who are shareholders in the concern. The undertakings in which the Company are interested show in the aggregate a very satisfactory augmentation of business; and the works and plant of the Company have been modernized to a degree that brings them into line with the best of Continental works of equal magnitude. The Company, or rather the Union des Gaz—the interests of the one being practically those of the other—have built new works at certain stations, and have rebuilt and modernized plant at their other stations. The Board are thoroughly satisfied with the solidity of their position in this respect; and the members are unstinted in their praise of the work that their colleague Mr. A. F. Phillips has done in this connection. The speeches at the meeting of the Chairman, Mr. Tendron, and Mr. Birchenough merely reflect what the other Directors of the Company and of the Union des Gaz feel in this connection. There has, of course, been a large capital expenditure; but as an investment, it will without doubt bring an excellent return through economies and improved working.

Co-Partnership Suggested for Italian Workers.

The one perpetual cloud at the Italian stations is that of labour. The difficulties in this regard appear to be never-ending. When things are going peacefully, there is still the overhanging gloomy knowledge that any day may bring a fresh eruption. It is not that the Directors and officers are inconsiderate and illiberal in payment and in the provision of reasonable conditions of employment, nor wanting in a conciliatory attitude towards their

men. But the time has come when, in the interests of shareholders and consumers alike, they can go no further. Mr. Walter Hunter, who is a shareholder in the Continental Company, is also a Director of the Commercial Gas Company, whose workers are Union men, but whose attachment to the Company's service has been cemented by co-partnership in a manner to which Mr. Hunter is proud to bear testimony. The certain loyalty of the men in an industrial undertaking is an asset upon which Directors, officers, and shareholders cannot put too great a value. In the co-partnership companies, there is no trouble, and no perturbation beneath the directorial and official surface as to what is going to happen next in connection with labour. The "next" is always contentment, willingness, and loyalty, through the knowledge of a common share in interests. His experience leads Mr. Hunter to recommend the Directors of the Continental Union Company to consider whether co-partnership cannot effect happier relations with the Italian workmen, and produce peace where constant disquiet exists. Mr. Lucas is very sympathetic, and promises that the matter shall have the earnest consideration of the Board. Whether a scheme can be devised that will be acceptable to the Italian gas workers, it is difficult to say. At this stage, however, it is best not to suggest insuperable difficulties. But this may be said—that, if co-partnership will not permanently compose the relations of employers and employed in Italian gas-works, then we know of nothing that will do so. If, too, co-partnership were successful in Italian gas-works, then we know of no conditions in gas-works carried on by private enterprise to which it would not apply. It will be interesting to see if anything comes of the suggestion; and a trial in Italy would be highly instructive.

THE GASLIGHT AND COKE COMPANY AND A CO-PARTNERSHIP SCHEME.

There is every reason to believe that the Gaslight and Coke Company will very shortly incorporate co-partnership in their policy and practices. The matter is not ripe enough yet to say more than this; but the bare statement is a sufficient intimation of a possible development that will, if consummated (as all present co-partners must earnestly hope it will be), have a striking effect in the gas industry in forwarding the great work begun by Sir George Livesey. As Chairman of the Tottenham Company, and as a Director of the Bournemouth and Croydon Companies (the workers of the last-named of which adopted co-partnership last Friday, with much enthusiasm), the Governor of the Gaslight and Coke Company, Mr. Corbet Woodall, has for some months past been vigorously championing the cause; and most observers of the course of events in the gas industry have felt that it could only be a matter of time before the name of that Company and the question of co-partnership would be associated more closely than as a mere abstract possibility. In the case of the Tottenham, Bournemouth, and Croydon Gas Companies, the men have given their Chairmen, Directors, and officials, the most gratifying encouragement.

GERMAN GAS AND ELECTRICITY TAX.

The most notable feature during the past week of the storm of protest against the Government proposals for the taxation of gas and electricity in Germany, is the presentation of a memorial to the Reichstag by the Association of German Engineers, asking the withdrawal of the projected scheme. Having regard to the highly representative and influential character of the Association in question, the memorial must be regarded as of great weight. It recites the more important objections to the taxation of gas and electricity; it points out that the tax is not a fair one because it only applies to two out of the large number of sources of energy, and therefore favours the other sources, such as blast-furnace gas, steam and water power, in their competition with gas and electricity. The tax also, it is contended, will hinder the healthy progress of German industry, in which a more general application of gas and electricity has been conspicuous during recent years. To tax these two sources of energy, and thereby restrict their use, would be to place a serious obstacle in the way of the advance of civilization. The public weal is furthered by the free use of gas and electricity for lighting and heating in towns; and the projected taxation would tend to interfere with and limit such use. In the case of electricity, also, the tax would place a heavy burden on means of transit. Apart from these direct and indirect injuries to industry, the imposition and collection of the tax would be attended with very great difficulties from the technical point of view. It is argued in the memorial that the diversion of business from gas and electricity to other sources of energy which would be provoked by the imposition of the tax, would lead to the yield therefrom being considerably less than is anticipated in the preamble of the financial scheme. The memorial concludes with an urgent petition to the Reichstag—put forward in the name of German industry as a whole, and without regard to the interests of any single trade or manufacture—to discard the proposal for this tax.

PERSONAL.

Mr. W. Williamson, Assistant-Manager of the Leven, Fife, Gas Company, Limited, has been appointed Manager of the gas-works at Oban.

Mr. J. Simpson has resigned his position as Manager of the Inverkeithing Gas Company, Limited, and the Directors have appointed Mr. J. Currie, a former Manager, to the post.

There were 80 applications for the position of Works Chemist and Technical Assistant to the Preston Gas Company, in response to the advertisement which appeared in the "Journal" for the 10th ult.; and Mr. C. R. Armitage, son of Mr. Charles Armitage, of Lancaster, has been selected. He is 24 years of age, had some experience with his father, and was subsequently articled to Mr. J. H. Brown, of Nottingham, with whom he remained as Assistant.

Mr. Leonard James Langford, son of Mr. W. Langford, of Longton, has been unanimously appointed, out of 73 applicants, Engineer and Manager of the Abertillery Gas-Works. He was born in Bath, educated at the Bath Forum and City Technical Schools, and received his technical training in gas engineering at the Bath Gas-Works, under Mr. C. Stafford Ellery, the Engineer and Manager. Six years ago he was appointed Assistant Engineer and Manager at the Longton Gas-Works, in which capacity he has given great satisfaction to the Town Council. The present make of gas at Abertillery is about 55 million cubic feet; but the works are totally inadequate for the rapidly increasing consumption. With extensions of mains and the erection of a new holder and manufacturing plant to be at once undertaken, it is thought the consumption will be doubled.

Mr. W. H. Johns, who was last Thursday appointed Works Superintendent at the Saltley Gas-Works of the Birmingham Corporation Gas Department, has for the last six-and-a-half years been engaged with Mr. C. Stafford Ellery, of Bath, as Engineering and General Assistant. He has there had the opportunity of gaining considerable experience in connection with large extensions and alterations to plant, as well as in the working of it. For seven years previous to that, Mr. Johns was with West's Gas Improvement Company, Limited. He is an honours silver medallist in "Gas Manufacture," holds several science certificates, and is Teacher at the Bath City Technical Schools in both Gas Engineering and Supply. Under Mr. Walter Grafton, he studied gas manufacture and chemistry at the Regent Street Polytechnic. There were 56 applicants for the Birmingham appointment.

OBITUARY.

The death occurred last Tuesday morning, in his 59th year, of Mr. William Wearing, the Engineer to the Fylde Water Board. Deceased was a native of Kirkby Lonsdale, and received his education at the Kirkby Lonsdale and Heversham Grammar School. Subsequently he was articled to Messrs. Garlick, Park, and Sykes, of Preston, and qualified himself as a civil engineer. His speciality was the construction of water-works; and a few years after the completion of his articles, he was entrusted with the carrying out of the Padiham works. On the death of Mr. Garlick, some nine years ago, Mr. Wearing took the position of Engineer to the Fylde Water Board. He was responsible for the designing and construction of the Grizedale Lea reservoir—an undertaking of great magnitude; and it was his regret that he was not able to see the works completed.

Chairmanship of the South Metropolitan Gas Company.—At last Wednesday's meeting of the Board, Mr. Charles Carpenter was elected Chairman of the South Metropolitan Gas Company; Mr. Robert Morton resigning this position, and resuming that of Vice-Chairman.

The Robertsbridge Prospectus.—In connection with the reference to this document in our leading columns to-day, the following paragraph from the "City Notes" of the "Pall Mall Gazette" of last Thursday may be reproduced: A new issue of preference shares is notified by the Robertsbridge, Salehurst, and Hurstgreen Water and Gas Company. The concern has an Eatonesque appearance, if we mistake not. By which we mean that it apparently emanates from a promoting group not a thousand miles removed from Cannon Street. At all events, it has some objectionable features. We do not appreciate, as much as the promoters evidently do, the attracting of the public by setting forth results achieved by established concerns in good centres in order to show what can be done with a rural undertaking. We like not the unnecessary play made with the name of Lord Brassey, who has really nothing to do with the concern. There is too much of the big black type about this prospectus for our liking; and if we are thought fastidious for saying so, we doubt not that, if the Directors wish it, we could say enough further to show that there is ground for it.

THE INDUSTRY'S MEMORIAL TO SIR GEORGE LIVESEY.

The Leeds University Scheme Adopted.

A meeting representative of all interests identified with the gas industry was held in the Hall of the Institution of Mechanical Engineers last Thursday, to consider what steps should be taken to perpetuate the memory of the late Sir George Livesey. From the outset, it was seen that the fullest sympathy with the scheme prevailed among professional and administrative gas men and plant and appliance manufacturers; but as to the form that it should take, opinion seemed very much divided and uncertain before the meeting. The proceedings had not gone far, however, before it was seen that the most practicable scheme was the one proposing the raising of a fund to endow a professorship of Gas Engineering and Fuel at the Leeds University. The President of the Institution (Mr. Thomas Glover, of Norwich) took the chair; and he was accompanied by the Vice-Presidents (Mr. J. W. Helps and Mr. Alex. Wilson), and the Hon. Secretary (Mr. S. Y. Shoubridge); Mr. Corbet Woodall, Mr. H. E. Jones, Mr. Charles Carpenter, Mr. Charles Hunt, Mr. Robert Morton, Mr. J. Horsley Palmer (Chairman of the Imperial Continental Gas Association and the British Gaslight Company), Mr. Charles Hawksley, and Mr. Walter T. Dunn. There were about eighty signatures recording attendance in the register at the door.

The PRESIDENT said they had met that afternoon to put into shape some permanent memorial, if possible, of Sir George Livesey, whose life and work all gas men held in the deepest respect. The meeting had arisen from a previous one, which was held on Nov. 19, called from among gas engineers and those representative of the gas industry generally. It was felt on that occasion that anything that was done should be done by those representing the industry as a whole, and that a meeting thoroughly representative of the industry should be convened. He was very pleased to see that such a large number had come from all over the country to help in formulating some practical scheme; and he had no doubt before they left that afternoon, they would have advanced the matter, and put it on a practical footing. They had received a large number of letters from engineers and others all over the country—in all, about fifty. Of these, twenty-seven expressed their hearty approval of the scheme, eleven expressed themselves in favour of a home for the gas industry, and six declared a strong feeling in favour of endowing a professorship in the Leeds University. A letter had just been handed to him by the Hon. Secretary from the Right Hon. A. J. Balfour, the ex-Premier, in which he said: "I greatly regret I cannot be present at the meeting on Thursday next in honour of Sir George Livesey. I have already given public expression to my esteem of the value of his services; and I am glad to think that it is proposed to erect some permanent memorial in his honour." Many of those present would have noticed the public expression referred to here. It was at the meeting at the Church House, a few days since, of the Labour Co-Partnership Association. There was also a letter from the Secretary of the Association (Mr. Henry Vivian, M.P.), who said: "I am extremely sorry that the engagement I spoke to you about has been definitely fixed for 2.30, so that it will be impossible for me to be with you on Thursday next. I need hardly say I wish success to your efforts to mark in a permanent way the public appreciation of Sir George Livesey's life work." Now he (the President) would read and propose, to put the matter into shape, a resolution that had been drafted:—

> That this meeting records its sense of the great loss which the industrial world has sustained by the death of Sir George Livesey, and, recognizing the life-long service which he rendered, pledges itself to actively support the movement now initiated for perpetuating his memory.

Mr. CORBET WOODALL seconded the resolution, which was carried by all standing.

The PRESIDENT (proceeding) said, at the meeting to which he had alluded as having been held on Nov. 19, three schemes were discussed as follows:

1.—That a fund should be raised to provide a Professorship of Fuel and Gas Engineering at the Leeds University, for which a sum of not less than £10,000 would be required.

2.—That a fund should be raised to provide scholarships to cover the cost of the higher scientific education of deserving young men intending to adopt gas engineering as a profession; the number of these scholarships depending, of course, upon the sum contributed.

3.—That a building be erected in some central position in London for the use of the members of the gas industry, which would contain a library, lecture-room, and rooms in which conferences and committee meetings could be held, and where provision could also be made for offices for the Council and officials of the Institution of Gas Engineers.

With regard to the third proposal, it was not intended to build a hall similar to the one in which they were then assembled, in which to hold their annual meetings, but simply a home for the Institution. These three methods of perpetuating the memory of Sir George were discussed at the meeting. Since then, they had one other suggestion, and that was for a fund for the endowment of the Institution of Gas Engineers for research purposes. This suggestion had come from Mr. Head, of the Vauxhall Gas-Works of the South Metropolitan Gas Company. He (the President) did not think he ought to influence the meeting in any way at this point, but leave the whole matter open for discussion, and then take the motion afterwards. He might, however, explain that Professor Smithells came up to town last Friday, and discussed with the Hon. Secretary of the Institution and himself the proposal to establish a Professorship of Gas Engineering and Fuel at the Leeds University; and he gave them a very pressing invitation to go to the Leeds University, and see what was being done there for the industry. Both Mr. Shoubridge and himself were unable to accept the invitation; but they prevailed upon Mr. Helps, of Croydon, to go to Leeds. They could not have sent a better representative. He would ask Mr. Helps to report to the meeting what he found at Leeds.

Mr. H. E. JONES asked whether there was any estimate as to what capital amount the scholarship scheme would require; and the sum that would be necessary for the building. One figure had been given—that for the establishment of the professorship at the Leeds University; but not for the other two schemes.

The PRESIDENT replied that as to the scholarships they had not arrived at any figure; but for the building and site it was suggested they would require not less than £20,000. After a pause, the President added that Mr. Woodall suggested that the scholarships would cost about £100 each per year.

Mr. J. W. HELPS remarked that, before he said anything respecting the Leeds University, he ought to explain what perhaps might appear, at any rate from his own point of view, a somewhat awkward position. It was he himself who suggested to the Committee the idea of the home for the gas industry in London; and it might appear strange if now, having made the suggestion, he spoke rather strongly in favour of a scheme for providing a professorship at Leeds. At the same time, after the discussion on the various points had taken place that day, he still reserved his right to vote for whichever scheme seemed to him the most favourable. He was very pleased to go to the Leeds University, and very gladly accepted the President's invitation to do so. He met Professor Smithells early on the morning of Tuesday last; and he spent the rest of the day until five o'clock with him. Professor Smithells courteously showed him round all the various departments of the University; but he left out the building that had been devoted to the purposes of fuel and gas engineering until the afternoon, when Professor Bone took him (Mr. Helps) in hand, and showed him everything there was to be seen that had any bearing whatever upon this question of the endowment of the chair. It appeared to him (Mr. Helps) that this matter required to be looked at from two different points of view. First of all, as to whether it was a scheme which was likely to prove the best form of memorial to the memory of Sir George Livesey, and, secondly, in the event of the meeting deciding that this was the case, whether Leeds was the best place at which the endowment should be made. As those present were well aware, there were many Universities in England now devoted to a great extent to applied science in connection with industries; and this policy of holding courses in which both the practice and the science went on hand in hand was very largely appreciated in the industrial districts. And from what he saw in Leeds perhaps he might say that nowhere was it appreciated in a higher degree than there. Leeds was in the heart of a great many industries. Professor Smithells felt very strongly that, for the good of industry generally, and therefore for the good of the country, it was most important that science and practice should go hand in hand; and he had adopted a scheme of organizing these applied science courses to a great extent with regard to the textile industry, the dyeing industry, and the leather industry, which flourished in and about Leeds. He (Mr. Helps) saw the various classes in full operation. The students had an opportunity of specializing in the various scientific branches. They specially dealt with the processes and principles involved in their particular businesses; carrying on at the same time a good deal of practical work in connection with these industries. He should like to say that most of the equipment, and much of the expense involved in carrying on the classes, had been met by the industries more or less directly concerned. These industries had received large grants not only from the guilds which represented them, but also from the manufacturers in the district; and, in return for this, the University authorities had formed what they called Advisory Committees for each industry, so that the Council had the advantage of consulting with them as to what was being done. He (Mr. Helps) saw the Pro-Chancellor (Mr. Lupton), and he told him that, in the event of a Gas Professorship being established in Leeds, the same opportunity would be given to the gas industry of establishing an Advisory Committee to work with the Council, and to advise them as to the courses of work that should be undertaken. He thought if this were done, they would have a warranty and assurance that the work undertaken would be of such a character as would benefit their industry. This matter wanted to be looked at from two points of view. First of all, from what might be called the educational point of view; and, secondly, that of research. These were two points that had engaged the attention of the authorities. With regard to education, those present would want to know what had been done so far at Leeds. They already knew that the education was of a university character; and the basis of it was that students should enter at

about the age of 17, and go through the full three years' course. That was the idea with regard to gas engineering as well as the other branches. At the end of the first year, the student would pass the ordinary intermediate exam. for his B.Sc. degree; and at the end of the third year, he would go in for his B.Sc. degree in gas engineering. The authorities were also prepared to accept students for a non-graduate course. Supposing a young man showed, on his entrance examination, that he had an amount of experience and certain education in ordinary matters, he would be accepted for a two years' course; and in exceptional cases a man was accepted for a single year. Professor Smithells pointed out that, if the Council were prepared to accept young men to go there for short periods in which to attain what he called a smattering knowledge, they would have no difficulty in filling their classes. He was against such a dilettante style. The consequence was there were only three students at the present time working in the gas and fuel class—one for three years, one for two years, and the other for one year. They were working under remarkably favourable conditions, and were giving good results. With regard to research work, it would be remembered that some time ago the Institution of Gas Engineers founded a fellowship at the Leeds University, and subscribed £100 a year; and they gave something towards the cost of equipment. The young man who held this fellowship was at present engaged in carrying out an interesting series of experiments on the behaviour of the incandescent mantle. Dr. Bone told him (Mr. Helps) they were looking forward to some excellent results from these experiments. A Sub-Committee of the Institution was also working there, in conjunction with another student, in finding out something in connection with the hygienic effects of gas heating-stoves. He (Mr. Helps) also had an opportunity of seeing the conditions under which these experiments were being carried out; and he was impressed with the way the work was being done, and the probability of good results arising. Dr. Bone himself, with his Assistant, was carrying out an abstruse and careful series of experiments with regard to the action of various gases when exploded under various pressures. He believed this would eventually have a far-reaching influence on matters connected with the internal combustion engine. The equipment of the laboratories was of the finest description; he (Mr. Helps) did not think he had ever seen anything so perfect. It seemed to him they were really in advance with the fuel branch of anything existing in other parts of the University. The sum subscribed by the colliery owners of Yorkshire to equip the buildings was £10,000; and the gas industry would be asked to join with them in the working of the building. He thought they would have no difficulty in saying this could be done, because the people who raised coal and the people who used it had a very common relationship. He did not know that he could tell them anything more. He was simply pointing out the conditions that existed at the Leeds University; and he could assure them that, if it was decided that the form the memorial should take should be the endowment of a professorship at Leeds, they might safely leave their interests in the hands of the authorities there. They had not only the equipment but the men, and would be able to carry out this work to what he believed would be a successful issue. The University authorities offered, as he told them, the advantage of an Advisory Committee. They were prepared to do what they could to meet the views of the industry, so that the research should not be of a purely scientific form, but should be carried out in direct relationship with the industry. They agreed that, if the industry subscribed the money, the industry should have a voice in directing the way the money should be spent.

Mr. H. E. Jones asked whether Mr. Helps advocated this scheme as the one to be preferred.

Mr. Helps: I would rather not do that.

The President remarked, with reference to the scheme for the endowment of a Professorship at Leeds University, it might be interesting to remind those present that Sir George Livesey took great interest in the Leeds University the last couple of years of his life; and he obtained some subscriptions for it as follows: From the Leeds Corporation Gas Committee, £100; Gaslight and Coke Company, £100; South Metropolitan Gas Company, £100; Commercial Gas Company, £30; Wandsworth Gas Company, £10; Newcastle, £20; South Suburban, £20; Dartford, £5 5s.; and a private subscription from Mr. Holliday of £3 3s. It was Sir George's hope and desire to raise an income of £500 a year for the Leeds University. The subscriptions came to £388. So he did not quite succeed in raising the amount he hoped to do; and he (the President) believed he was rather disappointed that his efforts did not bring in the full sum that he had hoped to raise. This, however, showed them that Sir George was fully in sympathy with the work that was being done at the Leeds University.

Mr. H. E. Jones said he should always be glad to raise his voice in any assembly in pursuance of any object such as the present one, which was to perpetuate the memory of a dear friend and a distinguished one. They had had put before them by their President four propositions; and he was bound to say the one that most commended itself to him at first sight was the one that Mr. Helps had so fully described. He knew Sir George had this particular matter at heart. The sums that had been mentioned were obtained by him for this very cause quite lately; and he was not in any despair of getting the whole amount. His time was so absorbed in his great projects, his time was so full of the great works he was always carrying out, that he could not give much attention to a kind of "by-wash" of this sort. If, however, he had lived a few months longer, no doubt the £500 a year would have been obtained. If this had been so, it would be seen at once that, by the conversion of the figures they would have got the interest upon £10,000, which the President had told them would be necessary to endow this Chair at the Leeds University. Therefore it would be conceded that it was a practicable project. With regard to the scholarships, this would be a useful thing; but then something like four scholarships would be required of about £75 to £100 a year apiece. This would involve much the same capital sum as that attributable to the professorship. Coming to the question of a building, he had at one time thought of having a good house for the Institution in London; but he should deplore seeing £20,000 spent upon accommodating the Institution in London alone, because it would be seen at once that the users of the building would not be at all comparable to that of the Institution of Civil or the Institution of Mechanical Engineers, of both of which he was a member, and in both of which they had such a large representation in London and the immediate suburbs. In the case of their own Institution—the members being scattered throughout England, Scotland, Ireland, and Wales—such a house would be but little used, except for a small number located in and about London. He certainly thought they would not be warranted in applying such a sum to this purpose. The scholarships, too, might be matters that would follow the professorial chair. They need not stop at the one project; but they could go on with the scholarships after the professorial chair had been established. Looking at the matter personally—and he knew the Chairman of the Commercial Company had the same feeling—his view was that whatever was done, it should be something that would be of use. Let it be a useful expenditure. In this case, he could not conceive that they could find a more useful outlet for the memorial fund than in the first suggestion. They heard the lecture at the last meeting by the gentleman who was at the head of the Department of Gas and Fuel at the Leeds University; and they must all have been struck with the return they already had in this direction. Personally, therefore, his advocacy was for the professorial chair at Leeds.

The President remarked that all would be gratified to notice that he had at his left-hand side the Governor of the Gaslight and Coke Company. Mr. Woodall had shown his sympathy with this movement by his presence, and by seconding the first resolution. He was sure they would like to hear his views.

Mr. Corbet Woodall observed that, only an hour or two previously, he hardly anticipated being able to be present; and he therefore hoped his hearers would excuse him if such observations as he had to make were not of a very well-considered character. They had passed a resolution affirming that it was desirable, and recognizing the wish of all, that some permanent memorial should be provided to the memory of their late friend. So far as the present generation was concerned, they did not want outside memorials to perpetuate the name of Sir George Livesey. His name was written in all their hearts, and would remain there. But a memorial was desirable not for those who knew him well, but for the generations that would follow. The men of a new generation, as they all knew, were very apt to forget those who had gone before, and were willing to build upon foundations that had been laid without thinking very much of those who had laid them. They desired to suggest to such—the labourers who would follow—the question: "Who and what was the man whose name is identified thus with the advancement of the industry and those who are working for it?" It appeared to him that the primary object to be borne in mind in providing a memorial was the memorial idea. And he mentioned this because, while he had no doubt that all recognized some directions in which they would be glad to see the interests of the industry served (many considered the building of a house in which the Institution might be lodged was one), he thought they should very carefully avoid making this the primary consideration. It would be a good thing to have a house to which to attach Sir George Livesey's name; but he was afraid that, after a little time, it would be known as the house of the Institution, and as a memorial it would practically have ceased to be of much value. Again with regard to the house, the cost of it would be very considerable; and it would be repellent to all of them to enter upon a scheme that would involve earnest and protracted efforts to raise the money. It seemed to him the grace of the movement would be spoilt if there had to be much canvassing for subscriptions. What they did should be done in such a way that the money would be forthcoming promptly and readily. Again, Mr. Jones had referred to the fact that, of members interested in the gas industry, a comparatively small proportion were resident in London; and he had received one or two letters from the country in which this point had been named. The Institution did not hold their annual meetings always in London; and therefore he thought that, from this point of view, the idea of erecting a house for the Institution would not meet the main requirements they had in view. His own feeling at first was strongly in favour of scholarships; but after thinking it over carefully, he had dropped this, because it appeared to him there was no security that the young fellows who might receive scholarships under the scheme would necessarily afterwards devote themselves to the service of the gas industry. And then, again, the number of scholarships would be comparatively few at the best. With regard to the professorship, this appeared to him to be an absolutely ideal proposal. There was some security that

it would go on not simply for a few years, but practically for all time, bearing the name of the Livesey Professorship of Gas Engineering. This would deal with a very much larger number of men than could possibly be dealt with under any scheme of scholarships. It would cost a sum that was well within their compass; and all round he thought it offered the best promise of an acceptable and enduring memorial. They had been told that Sir George took a considerable interest in the Leeds scheme. He talked it over with him (Mr. Woodall); and, as they had been told, the Company Sir George represented, and the Company he (Mr. Woodall) had the honour to represent, both agreed to subscribe a certain sum annually. As had been said, the amount then raised was not sufficient to cover the cost of the professorship; but had their friend's life been prolonged, he (Mr. Woodall) had no doubt whatever that the rest of the money would have been found, and found with ease. If the professorship project was adopted, then there would be no longer any necessity for the payment of the annual subscriptions; and, though he had no authority to speak for others, he felt no doubt that those who had contributed so far an annual sum, would commute it for a certain number of years' purchase. At any rate, he could answer for it that the Gaslight and Coke Company would do so in the event of this being the system adopted by the other contributors. But the sum, he devoutly hoped, was not going to be raised merely by the contributions of companies and corporations. It was a scheme in which they should all join; and it should be the desire of the Committee who had the matter in hand, as he was sure it would be the desire of all members of the profession, to encourage subscriptions of amounts corresponding to the means of the subscribers. The scheme should bring in all possible—those who had worked with, and in connection with, and under the guidance of, the man whom they desired to honour. If this was done, a very small subscription would be wanted from each of them, in order to raise the amount required. They had heard from Mr. Helps a most admirable statement with regard to the facilities available in the Leeds University. There was no question, in his own mind, whether Leeds was a suitable place. It was in the centre of a large industrial district; and the Leeds University, it appeared to him, was better situated than any other University that had taken up this idea of the combination of pure science and its application in the laboratory and the workshop. Then, again, Leeds was in the centre of a large number of towns having gas-works, and with many members of the gas profession in them. He believed in the Midlands and the North the adoption of the Leeds University would be approved. He had no more to say with regard to the matter, except that there were those two points that should be particularly borne in mind: That the memorial should be an enduring memorial; and that it should be of a character which would attract the whole of the members of the industry, so that the money needed might be readily forthcoming.

The PRESIDENT said he was sure they all felt grateful to Mr. Woodall for so clearly expounding his ideas. He would now ask Mr. Carpenter to address the meeting.

Mr. CHARLES CARPENTER remarked that the last speaker had said nearly all that he could have wished to say himself; but he would like to take the opportunity of putting in a few words in support of the proposal as Mr. Woodall had explained it to the meeting. He (Mr. Carpenter) thought there were many reasons why they should discard the suggestion of building for themselves a house. If they had an idea of doing anything of this kind, he did not think it would be proper to make the present occasion the one for carrying it out. If they wanted to build themselves a house, very well; but do not let them make the passing of Sir George the opportunity for providing that adjunct. With regard to scholarships, a case came before him some time ago of one of his stokers. He had four sons, and each gained a London County Council scholarship of £30 to £35 a year. The eldest of them was, at the age of 24, in the Patent Office, and the second in the Foreign Office. If there were such facilities already existing for education, he really did not consider it was necessary to amplify them in Sir George's name—more especially remembering, as Mr. Woodall had pointed out, that they could not ear-mark the training received under the scholarships for the benefit only of the gas industry. With regard to the third proposal, this commended itself to him—he meant the endowment of the professorship at Leeds. He thought that Leeds was a very good centre, for more reasons than one; but he would give them one. When asked for it, his advice to everyone who wanted to be an engineer was, "Get away from London. Get away to the North, and you will have a better engineering education than you can possibly hope to secure in London." This professorship was an idea which commended itself greatly to Sir George; and when they remembered that there was no project for technical education with which he ever associated himself but this, he thought in that fact alone they had a great opportunity of providing a memorial. And then there was the fact that his endeavours did not meet the success he wished for during his lifetime. He was not happy about it. They would remember what he said at the meeting which took place some time ago—how desirous he was of placing the burden where it should be properly carried, on the Institution of Gas Engineers. He (the speaker) thought therefore they might say to themselves, "What we did not do when Sir George was alive, we can do with good grace now." This was another reason, too, why this form of memorial appeared to him to be one that should enlist all their sympathies. He heartily supported the endowment of the Leeds professorship.

Mr. CHARLES HAWKSLEY asked how this Chair would be associated, as Mr. Woodall had suggested, with gas engineering alone, because, as he understood from Mr. Helps's full statement, the laboratories now carried on were for the study not only of matters relating to gas engineering, but of those connected with the consumption of coal generally, and had the support of the manufacturers of the kingdom other than gas manufacturers. Therefore he took it that unless the professor was to be withdrawn from the general work of the laboratory—which he supposed would not be the case—there would need to be some guarantee that a due proportion of his time would be devoted to the following up of matters connected with the gas industry alone. He merely asked for the information because it seemed to him that—though he heartily concurred in the suggestion for the endowment of the professorship—some difficulty might arise in regard to how the professorship would be applied, whether on matters connected with the gas industry alone, or on those concerning the general welfare of the country with reference to coal consumption.

Mr. WOODALL: The Council of the University are perfectly willing that this professorship should be appointed for gas engineering and fuel; and I did intend to have suggested before that some means should be taken to maintain a hold upon the endowment, so that if the work were not carried out in the way that Mr. Hawksley desires, and we desire—essentially in the interests of the gas industry—we might make representations, and, if necessary, withdraw the endowment, and see that it was employed in the direction we have in view. But, at any rate, if the professorship is appointed, it will be the Livesey Professorship of Gas Engineering and Fuel.

Mr. HAWKSLEY: I do not wish to be understood to say that aid should not be given to the consumers of fuel in other directions, but that the main idea of the professorship should be that of the gas industry.

The PRESIDENT: I think we are doing quite right to consider how the professorship should be safeguarded for our industry; and no doubt proper steps will be taken, as Mr. Woodall has indicated, to do this. Continuing, he said they had with them the Chairman of the Imperial Continental Gas Association—the largest foreign gas company with offices in London; and he was sure they would all be most delighted to have a word or two from Mr. Horsley Palmer.

Mr. J. HORSLEY PALMER remarked that he had not expected to be asked to address the meeting on the subject that was then before them. He might, however, say that he attended the gathering about three weeks ago, to which the Chairman had referred, and there then took place an informal sort of discussion with regard to the three proposals mentioned. He was glad to find that Mr. Helps, in his able statement that day, had cleared away from his (the speaker's) mind a great many points which seemed, he would not say to quite bar, but to influence him rather against the establishment of a professorship at Leeds. So much had already been said by others, that he did not think there was any necessity for him to add to it. Of course, there was something to be said in favour of scholarships; and he thought they could be guarded in the same way as a professorship could be. That was to say, the young men to whom these scholarships were given could be bound down—as many scholarships were bound down—to study gas engineering in England or on the Continent. Having himself had a great deal to do with Continental gas making, &c., he could assert that there was no question that many young engineers in England would benefit greatly if they were able to obtain a travelling scholarship to enable them to see some of the great and interesting experiments which were taking place in the gas industry at the present moment at the various stations, especially in Germany. This was his one reason for rather favouring the scholarships. But now, having heard everything that had been said, he felt certain the proper thing was to support the resolution with regard to the establishment of a professorship at Leeds. He only hoped, if this were decided upon, that there would be a serious effort in the gas industry to secure a sufficient number of students to make it worth their while to pay £500 a year. Mr. Helps had stated that there were only three students at Leeds now; but, of course, the department had only been in operation one year. Anyway, some active steps should be taken to induce young men to go to the University to get the benefit of the professorship sought to be established.

Mr. HELPS said that, with reference to Mr. Hawksley's remarks, he quite agreed that there was just the danger that the money that would be subscribed under this scheme would not be devoted entirely to the purposes for which it was intended; and he had raised this question very strongly with Professor Smithells. It was pointed out by Professor Smithells that their great safeguard would be in adopting the scheme which was being taken up in connection with the other industries, and choosing an Advisory Committee who would have power in regulating the course that would be carried on in connection with gas engineering. Then perhaps he did not make himself clear with regard to the share borne by the mining industry in the establishment of the scheme. He meant to say the building and its equipment were entirely provided at the expense of the coalowners in Yorkshire and the neighbourhood, who spent £10,000 on it. In addition also to the services of Dr. Bone and his Assistant, there were ten or twelve other professors engaged in connection with it, among whom much of the technical work would be divided. Thus there would

be very little chance of Dr. Bone's services being required in such a way as would rob the gas industry of them. He thought they might assume that, if they formed an Advisory Committee and instituted the professorship, their industry would be really well served. An indication of the value of the education given to students at Leeds could be gathered from the report for 1907-8, which gave a list of the successes won with regard to business appointments by students after they had left the college. It would be interesting for those present to get copies of the report, when they would notice the very important positions in industrial works that had been given to students who had carried out their education in the Leeds University. Among the names of industrial firms which particularly attracted his attention as being closely connected with the gas industry was that of Messrs. George Bray and Co., of Leeds, who gave £1000 to the endowment of this fuel school. He heard that Messrs. Bray had taken a chemist from the University, and were so pleased with the results that they took a second, and he believed a third; and the firm told the University that the £1000 given had been repaid them over and over again by the results that they had secured. The Farnley Iron-Works said they blessed the day the University was started; and others had said the same. No doubt the plan would be complete if they could include in it a scheme for scholarships; and the suggestion had been made that when gas companies saw good men in their employ they should grant them leave of absence and give the scholarships. In this way they would have a complete scheme. He was going to withdraw his adhesion to the home scheme, and go strongly in favour of the Leeds University proposal. He took it that they would not part with their capital. They would give the income to the University, and would therefore always have entire control of the money.

The PRESIDENT: Yes. There are perhaps some gentlemen present who came feeling that a home for the industry is the best form of memorial; and they may still be of that opinion, and would like to give voice to it.

Mr. LEON GASTER entirely agreed with the suggested and the strongly supported plan of honouring Sir George Livesey's memory. The creation of a lectureship he considered admirable, as education to students was a gift they retained for all time, and the industry could only benefit as a result. But manufacturers should realize that a duty was required of them in order that the value of the gift might receive the recognition it deserved. They must give practical expression to their appreciation of the benefits to be conferred on young gas engineers in this country, by insisting upon higher qualifications, coupled with adequate remuneration, in those who would be required to fill responsible positions. Otherwise students would naturally hesitate to give up the additional time as well as incur the extra expense involved. Reference had been made to the small number of students who had as yet availed themselves of the present educational facilities in this respect at Leeds University; and this seemed to be an illustration of the need to which he had referred.

Mr. R. O. PATERSON, after pointing out that he only represented himself alone, as he had not had an opportunity of putting the matter before his Board, said he had come with a feeling that he was less disposed in favour of the Leeds University professorship than of either of the other two schemes. He was, however, bound to admit now, after what he had heard, that his feeling was favourable to the professorship; and he need only say that, although Leeds was not the centre of the Empire, it appeared to be the best centre for such a professorship as that they were proposing to endow. He had in his mind a remark which Mr. Helps made—namely, that they expected young men to go to Leeds University at the age of 17, and there serve a three years' course. Did this mean that it was only by going through this expenditure of time the degree of Bachelor of Science could be obtained?

Mr. HELPS: It must be a three years' course, and 17 years is the minimum age.

Mr. PATERSON (continuing) said that one of his boys—who was over 17—had made up his mind to go in for gas engineering. He was at Cheltenham; and he (Mr. Paterson) had been strongly advised to send him to a workshop for two years before putting him in a university or technical school. As he was now 17½, he would, in that case, be 19½ or 20 before he went (say) to the University of Leeds. He, however, understood that this matter could be arranged—though 17 was the minimum, there was no maximum, time involved.

Mr. HELPS: Dr. Bone told me 17 was the minimum; but I see now that no day students are admitted under 16 years of age.

Mr. F. TEMPLER DEPREE (Chairman of Messrs. Willey and Co.) said there was one matter which was not quite clear to many of those present—namely, whether there was any special reason for selecting Leeds, or whether any other university, if a professorial chair was started, would be equally eligible for this memorial. Mr. Woodall had given as one reason the fact that Sir George interested himself in the Leeds University; but he (the speaker) did not know whether any other universities were discussed at the time the suggestion was made. Many of them would be glad to be informed on this point. There might be opportunities in some of the other universities in the North, or even the University of London. Another question which arose was as to whether, if scholarships should not be provided, the expenses of students would not militate very much against young lads using the opportunities the professorial chair would confer. He would be glad to know if there were any special reasons for selecting Leeds.

The PRESIDENT remarked that he thought these reasons had already been fully explained. One of the chief of them was Sir George's own interest in Leeds University. He had satisfied himself that Leeds was the best centre for the fund he raised. There had been fitted up there special laboratories for the study of the science of fuel, and they now proposed to teach gas engineering. They laid themselves out specially for technical work, and had shown from what they had done that they could do for the gas industry what they had already accomplished for other great industries. Professor Smithells was really the apostle of applied science.

Mr. DEPREE said this quite answered the question.

Mr. W. R. HERRING, on being called upon by the President, said it was not his intention to have spoken. He had been deeply impressed with what other speakers had said, and particularly by Mr. Helps's lucid description of the laboratories that were already existing in the Leeds University. They were evidently well equipped for carrying out the object which that gathering seemed mostly to have in view. The question as to the security of the endowment was, he thought, a matter of detail, and one which need not occupy much time at this meeting. It was undoubtedly important that the endowment should be associated with Sir George Livesey's name; and it was further necessary that there should be some administrative check upon the University authorities, to see that the right kind of research work was carried out. Personally, he did see a difficulty in looking upon this as a training college. He thought the endowment was more likely to be of advantage and benefit to the industry with regard to its research work. There they would have a highly trained staff of men who they knew were enthusiastic in the particular calling of those present that day; and probably they might have to spend more or less of their years in elucidating some of the problems of which they admittedly knew very little in regard to the behaviour of coal when it was subjected to heat in the retorts. They would elucidate these problems; and probably in one lecture or short pamphlet they would give enough information to set every technical school in the country at work to apply the knowledge to the daily commercial needs of the industry. He thought that the professorship would be more useful in this respect than in mere lecturing of students. Of course, there was a difficulty. A student could not afford to spend three years in what, after all, was little more than a chemical laboratory, and then go out to learn engineering and all the other things with which he had to become acquainted—to say nothing of the commercial knowledge he must acquire. So that they should really rather look to the endowment from a research point of view. He had the greatest sympathy with the proposition, and heartily supported it.

The PRESIDENT remarked that they had with them the Secretary and some members of the Society of British Gas Industries. They would like to hear something from them.

Mr. A. L. GRIFFITH, the Secretary of the Society, said he had not received any views from the members as to the form they thought the memorial should take. He thought they were rather waiting to see what would be done that day. Unfortunately, Mr. Charles Clare, the Chairman of the Council, was prevented by indisposition from being present, as he had intended. At their meeting the previous week, the Council said they were in entire sympathy with the proposed memorial to Sir George; and they were willing to co-operate in the matter. He had written to all the firms in the Society asking them to attend the meeting; and he had received a great many answers—in most cases expressing regret that the writers could not be present that day, but stating their sympathy with the motive and their desire to co-operate with the Institution in the matter. Speaking for himself personally, he thought the University scheme was the best.

Mr. ARCHIBALD P. MAIN, who remarked that he only rose in response to the call of the President, said his original feeling was very much in favour of endowing research work, because he was conscious of the difficulty that must be experienced by many students in leaving the workshops in which they had served their apprenticeship and going elsewhere. Mr. Herring had really put a good deal of this feeling into his statement. He (the speaker) had been thinking only of the city he knew best—and that was Glasgow. There they had an immense technical college—when completed it would be the largest, he understood, in Britain. Of course, it was an admirable centre for any young man serving his engineering apprenticeship; and he always remembered an expression of the late Mr. Foulis, when someone asked him the best thing for his boy to do. He said, "First of all let him serve his engineering apprenticeship, no matter what he is going to do after that." There were many young men in Glasgow serving their apprenticeship at engineering; and they went in the evening to the technical college. It would be very difficult for them to take advantage of the Leeds University; but he thought Mr. Herring had really "hit the nail on the head" when he pointed out the immense service research work would be to the whole of the gas industry. From this point of view, he must say, as a manufacturer of gas apparatus, they certainly hoped to secure benefit, as well as others.

Mr. BRYAN DONKIN also briefly supported the proposal for the founding of a Chair at Leeds.

Mr. D. IRVING said he was representing only himself, and had no authority whatever from the Bristol Gas Company, with whom he had the honour to be connected. Personally, he had not been in favour of this endowment of a professorship at Leeds. He was just a little afraid that there was a tendency at the present time to overdo this technical education. He had been in touch

with a number of young men who had had a first-class technical training, but who had the greatest difficulty in securing berths. Nearly every large city in the kingdom had a very excellent university—more or less excellent, he would say—and all were spending their time training young men in engineering and in chemical laboratories. His own feeling was that there was just a little tendency for such training to become stereotyped and to work in grooves. If this establishment of a fund was thought to be the best form of memorial, he would like to suggest that the money might be used for individual research in various works and by various young men—or perhaps elder men who had not the means for carrying out the work themselves. At any rate, there was no lack of technical schools throughout the country. This was his feeling, and he believed the experience of many members of the Institution. The difficulty was to get students; and this was the one weak spot in the arrangement to endow a Chair at Leeds. The fact that it had been stated that there were only three students at the present time, was evidence that, even if this were the best form of memorial, it was not perfectly clear that Leeds was the best centre. The only unfortunate thing was that, while he did not agree with the proposition—and it was very easy to criticize—he did not know that he had any matured scheme to suggest, except the idea that he should prefer that the fund to be accumulated as a memorial fund should be used for the assistance and encouragement of research in any part of the country, without localizing it in any one particular centre.

Mr. DOUGLAS H. HELPS stated that if it were decided to found this Chair, the memorial would have the most sympathetic and material support of the Directors of the Reading Gas Company. They were taking a great interest in the matter. He assumed that, if the Chair were founded, the Institution would probably appoint an Advisory Committee to work in connection with the University authorities; and no doubt they would agree from time to time to undertake work which was asked for by such a Committee.

The PRESIDENT: As there has been such a decided leaning towards the professorship, I have pleasure in proposing—

> That a Livesey Memorial Fund be now opened, and that contributions to it be invited with the object of endowing a Professorship in Gas Engineering and Fuel at the Leeds University.

Mr. HERRING seconded the motion.

Mr. JONES remarked that, in supporting the proposal, he should like to impress upon the members what a gracious compliment this would be to him whom they honoured so much, if they regarded it as a personal gratification to subscribe a sum, however small it might be, individually. Do not let them rely too much upon Corporate companies. They would no doubt, in their own interests, see that the amount of money required was forthcoming; but he would like to see a number of contributions from individual members of the industry, so as to make the memorial a hearty, gracious compliment to their deceased leader.

The PRESIDENT: If there is no amendment, I will now put the motion to the meeting.

This was done; and the resolut.on was carried unanimously.

On the proposition of Mr. CHARLES HUNT, seconded by Mr. W. J. LIBERTY, a cordial vote of thanks was passed to the Council of the Institution of Mechanical Engineers for their kindness in granting the use of the hall for the purpose of the meeting; and on the motion of Mr. JONES, a similar compliment was accorded to the President for bringing the subject forward in the complete and earnest manner that he had done.

FRANCO-BRITISH EXHIBITION GAS SECTION.

Presentation to the Hon. Secretary, Mr. J. W. Helps.

At the conclusion of the George Livesey Memorial Meeting last Thursday, members of the Committee of the Gas Section of the recent Franco-British Exhibition assembled at the Chief Offices of the Gaslight and Coke Company, in Horseferry Road, Westminster, and performed a short but pleasing ceremony. That is to say, they presented to Mr. J. W. Helps, of Croydon, a token of their well-merited appreciation of the work done by him in his capacity as Honorary Secretary to the Committee. The gift took the form of a pair of silver candelabra of beautiful design, copied from a fine old pattern. Each bore on its base the following inscription:—

> Presented to J. W. Helps, Esq., M.I.C.E., by members of the Gas Engineering Committee of the Franco-British Exhibition, 1908, in recognition of the services rendered as Honorary Secretary of that Committee.

Mr. H. E. JONES, addressing Mr. Helps, said he had been requested unanimously by the Committee to ask his acceptance of the trifle in silver which was before him on the table, and which, although insignificant as in any way representing what their feelings were towards him, nevertheless arose from a very spontaneous and very earnest desire to give him some token of the hearty thanks which the Committee owed to him for his valuable aid in connection with the Gas Section of the Franco-British Exhibition. Only a few minutes before, he (Mr. Helps), in an assembly much larger than the present one, had given a further manifestation of the great capacity that he possessed for coming to the help of movements of all kinds in the gas industry. It was unnecessary to go into the history of Mr. Helps's connection with the Institution of Gas Engineers and the Southern District Association of Gas Engineers and Managers. This was well known to everybody present; and he should only be "painting the lily" if he went over it all again. It was delightful to him to find, on the completion of the labours of the Committee, that the feeling was expressed on all sides that the devoted service rendered by Mr. Helps in connection with the Gas Section of the Exhibition deserved some permanent recognition—he had empty votes of thanks as well—and so they offered him this gift. It was not so bad in its small way; but it was not in any sense adequate to express the gratitude of the Committee. They hoped, however, that the contemplation of it by Mr. Helps on his social table would serve to recall the year-and-a-half of very hard work which he had had, and for which his colleagues would always feel extremely indebted to him. They all of them felt that the exhibit of the Gas Section could not possibly have been the success it was unless they had had the benefit of Mr. Helps's ripe and energetic assistance.

Mr. D. MILNE WATSON said that, as Deputy-Chairman of the Committee, he had pleasure in seconding Mr. Jones's proposal that they should present the pair of candelabra to Mr. Helps. They were all most indebted to him for the unstinted labour he had put into the matter of the Gas Section. Probably he (Mr. Watson) saw more of it than most of those present; and he knew the enormous amount of work that had had to be done. In such a case as the one in point, everything depended upon whether the man who tackled the matter was possessed of tact. Mr. Helps had exercised admirable tact; and the gas industry generally, and especially the Committee, owed him a heavy debt of gratitude. Certainly, the gas industry had benefited; for during the Exhibition there were more than 3000 inquiries sent on to over 300 gas companies. Therefore those who had supported the Gas Section had no need to regret having done so. Mr. Corbet Woodall was sorry that, owing to another engagement, he was not able to be with them during the presentation; and several letters expressing regret at their absence had been received from other gentlemen.

Mr. HELPS, acknowledging the gift, remarked that when only a few days ago Mr. Watson informed him that something of this sort was going to take place, he was, in vulgar language, "knocked in a heap," because he could not understand why anything should be given to him for the little he had been able to do in connection with the Franco-British Exhibition. He could not see why he should be singled out, and others who had done just as much as he had should be left out in the cold. He almost felt inclined to suggest that the present should be cut up into pieces and distributed among those who were as much deserving of it as he was. He, however, sincerely thanked them for the gift, because it at any rate showed that his efforts were appreciated in this matter. It was a pleasure to him to do what he could to help the industry which he loved, and which he trusted would love him sufficiently to enable him to earn his bread and butter out of it for some years more to come. At the same time, he almost wished he had been left out of this ceremony, because it really seemed invidious to single him out in this way. He thanked the Committee again for the great kindness they had shown him, not only by the presentation, but in their dealings with him throughout. It was to him an intense pleasure to meet especially the gentlemen who formed the Sub-Committee, and to find that they were heart and soul in the matter, and that a vast amount of good-fellowship existed between them all. Any venture was sure to turn out a success if the fellowship was good. It was so in this case; and he heartily enjoyed the meetings, &c., which were held. The candelabra would take honoured places on his sideboard and dinner-table, and would ever point backwards towards the very happy time he spent in connection with the Exhibition. The gifts would be handed down to those who came after him; and they would value them as a mark of the respect in which he was held by at any rate some of those engaged in the gas industry.

An Inclined Gas-Purifier.—A French patent has been taken out by M. Vinay for a gas-purifier composed of a series of inclined superimposed grids supporting the purifying material. According to an abstract of the specification in the "Journal of the Society of Chemical Industry," the material is introduced at the upper end of each layer of grids, through apertures which can be closed with gas-tight horizontal lids. The discharging is effected through vertical doors at the lower end of the grids—an arrangement which allows of charging and discharging by gravity; thus saving much labour, and obviating the lifting of a heavy cover.

Proposed Representation of Trading Societies in the Upper House.—The Earl of Wemyss has placed upon the paper of the House of Lords a notice of his intention to move the following resolutions: (1) "That in the opinion of this House it would be for the public good that important national training and other organized societies should each name three Peers in the current and each succeeding Parliament to speak and act on behalf of such societies on all questions in which they are interested; and that the names of the Peers so nominated be entered in the Journals of the House." (2) "That the Lord Chancellor, the Marquis of Lansdowne, the Earl of Crewe, and the Earl of Halsbury be empowered to determine what societies are of sufficient importance to be admitted to the privilege of nomination."

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 780.)

LAST week opened very dull on the Stock Exchange. The air was heavy with the momentous Eastern question (seemingly no nearer to solution), added to a number of minor factors not weighty individually, but all in the adverse scale. Prices drooped all round, and there was no heart in anything. Tuesday was shifty and irregular, with no ray of encouragement in any quarter. Consols were lower; and their continuous fall began to suggest the disagreeable possibility of their revaluation as a security. Wednesday was better. The fortnightly account gave promise of going through smoothly, foreign affairs looked less black, and Consols had a fractional recovery. The improvement was well maintained on Thursday; the Eastern horizon looking decidedly clearer. Gilt-edged investments were quite lively, Home Rails made better figures, and Foreign stocks were firm. Friday was a cheerful day. The settlement was safely over, and fresh business was very quiet, but still there was no drooping for lack of support. Consols rose $\frac{3}{16}$, the Railway Market was firm, and the robustness of the Foreign Market was a bright point. The cheerful tone was maintained to the close on Saturday, and markets were steady, or better than steady, all round. In the Money Market, there was a very fair demand for the Stock Exchange and other requirements, and rates stiffened; but discount, after standing firm awhile, gave way towards the close. Business in the Gas Market was somewhat more active than the week before; and the same firm tendency in general, coupled with a number of moderate advances in several stocks, was an agreeable feature. Most of these were in foreign undertakings; but, having regard to the foggy weather recently prevalent throughout this country, home gas companies must have had a nicely improved sale of gas for the first half of December, and might look for a rise. In Gaslight and Coke issues, the ordinary was active and firm, with transactions rising from 100⅝ to 101. The secured issues were steady; the preference being done at from 106¼ to 107, and the debentures at from 85½ to 86½ *cum div.* South Metropolitan was a little busier, but unchanged in price. Transactions marked ranged from 119½ to 120¼. In Commercials, the 4 per cent. was done at 106½ and 107, the 3½ per cent. at 103, and the debenture at 83 *cum div.* In the Suburban and Provincial group, Brentford old changed hands at 246½ and 248, ditto new at from 188½ to 189½, British at from 42¾ to 43¼, and West Ham at 107½. Business in the Continental companies was extremely quiet. Imperial was lightly dealt in, with a rather easier tendency—transactions ranging from 180 to 181¼. The debenture made 96. Union was done at 109¼; but Europeans were not touched. Among the undertakings of the remoter world, Buenos Ayres changed hands at 11⅜ and 11 11/16, Bombay at 5⅞, Melbourne 5 per cent. at 101½, Monte Video at 11⅞, Oriental at 138½, Primitiva at 5 15/16, ditto preference at 5 3/16 and 5 5/32, River Plate at from 13 5/32 to 13¼, and ditto debenture at 95.

ELECTRICITY SUPPLY MEMORANDA.

Warning by the Phœnix Company's Chief Electrical Engineer—Flexible Installations have a Sullied Record—Not Half the Electrically Caused Fires Reported—Bad Effect of a Bad Experience—Parliamentary Prospects.

THE safety of electric lighting is proverbial—within the limits of the literature that finds exit from the offices of the local electricity undertakings. The records safely screened from the public gaze in the Fire Insurance Offices tell a very different tale. The authority for making this assertion is no less than Mr. S. G. Castle Russell, M.Inst.E.E., the Chief Electrical Engineer of the Phœnix Insurance Company. No one will accuse this gentleman—an electrical engineer, and occupying such a responsible position—with being prejudiced against electricity, nor with being dishonest in his narration of the facts that are to his hand. There is a question that immediately occurs to one in having Mr. Russell's official designation brought to notice. Why do the Phœnix Insurance Company require an Electrical Engineer? The use of the word "Chief" suggests too that a few others are in the same service. Gas is used to a far greater extent in London than electricity; but we have not the pleasure of knowing any Phœnix official who pursues his professional career under the title of "Chief Gas Engineer." But that is only a preliminary thought aroused by an account of an interview that a representative of the "Electrical Contractor" has had with Mr. Russell, to ascertain how he regards the agitation now proceeding in the British electrical world for clearing away the obstacles to freedom in the use of flexible cord for surface wiring. This is the position: The metallic filament lamp has commenced stripping some of the fat off the lighting load of many electricity undertakings; and the engineers are on the alert for means of recouping themselves for the loss. The cost of installation, they say, stands in the way of making progress in getting new lighting consumers. *Ergo*, there must be cheaper installation; and surface-run flexible wiring is the only hope. But the Insurance Companies are inexorable. They know the stuff, they know the danger, and they have sternly set their faces against being parties to the pursuit of any such degenerating course in the matter of electrical installation. The electricians, finding them immovable, have been trying the effect of abuse at a distance instead of going to them, and asking if they have any substantial reasons for their opposition.

That they have is quite obvious from what Mr. Russell told the interviewer of the "Electrical Contractor." Leniency has marked the treatment of electric lighting by the Fire Offices; but that having been their attitude under installation work ruled and regulated with the view of reducing the fire risk, and having had a fairly bad experience even under these circumstances, they would be false to their own interests and those of the public if they connived at installation of a still more dangerous character. While the experience of other countries has led to the raising there of the standard of wiring, electrical engineers in this country—not all, but many—are perfectly indifferent to consequences so long as they can book more business, and are quite willing to at once make the retrograde move to the position that electricians in other countries are abandoning. In considering this tendency of British electrical engineers, past experience cannot be ignored. America commenced the lighting business with cheap wiring. Between 1894 and 1906, there were records of ever 340[illegible] fires caused by electricity in America, causing loss aggregating many millions sterling. In these figures, Mr. Russell states, only records properly authenticated by technical men were admitted and now America is aiming "at a standard to which we have become accustomed in England for years past. There is no question now of allowing flexible cord wiring in America; it being absolutely prohibited in show windows." Again the "Electrical Review" in 1904 stated that the German authorities proposed to institute police inspection of electrical installations "because 62 per cent. of all recent fires in Prussia have originated in defective installations." In the sphere of gas supply, we know of the compilations of Herr Schafer regarding the relative fire-producing capacity of electricity and gas. The Editor of the "Electrical Contractor" also finds that "in Berlin, which may be taken as the headquarters of the much-vaunted flex method, electrical fires average one for every 900 consumers, as against one fire caused by gas to every 8000 consumers." Mr. Russell also declares that the great majority of his colleagues in the insurance world do not look with favour on the introduction of flexible cord wiring.

It would spoil what follows in the account of the interview to cut a single word out of a deliberate statement that Mr. Russell let fall into the ear of his journalistic visitor. He said:

We fire office officials are in a position to know the risks of electrical work. I read in the electrical papers from time to time complaints that the newspaper reporter is very fond of a stock phrase concerning the "fusing of electric wires" when writing-up a fire. For the information of trade readers of your paper, I would state definitely that *not half of the electrically caused fires in this country are reported in the daily newspapers.* Contrary to what appears to be a general impression, electrical fires are *not* reported in the papers. Why here I have a list of fifty electrical fires which have taken place in this country since Jan. 1st this year *in a single area* under one authority! These are in addition to other instances outside this area that I have had to report upon. I do not wish it to be supposed that I consider electricity a serious risk as fire risks go; but to talk of the "absolute safety" of electricity is—well hardly correct. And all this in face of the good standard of wiring in this country. Is it remarkable then that we view the introduction of flexible cord systems with apprehension? I feel that the introduction of cheap wiring methods will do a great deal of harm to the trade. This will not be apparent at once; but, as the wiring deteriorates, so fires will occur and public alarm ensue.

Of course, it is quite open for an electrician to put in any class of installation he likes; but the Fire Insurance Offices have just as much right to decline to take the risk involved. If the electrical undertakings have a liking for the cheaper installation by flex, then let them obtain powers to take up an insurance business in conjunction. It is fancied they would think twice before making such a move; but for what the suggestion is worth—we admit it is not worth much—they are welcome to it. However, the proposal to adopt surface-run flexible, for cheapness sake, in order to secure more custom, if pursued, would at the best only give a temporary fillip to the electric lighting business. The increase of fires, when deterioration of the wiring commenced, would counteract all the advantage of cheap installation. Electricians above all people ought to know by this time the bad effect of mysterious fires and of failures. Mr. Russell makes a strong point of this. Few people, he says, realize the great dread of fire entertained by the average man after he has experienced an outbreak the cause of which he cannot understand. The Phœnix Company continually come across people who insist that, if there is any risk, the installation must be done away with. One of Mr. Russell's recent experiences was in connection with a West-end flat which had been re-decorated and re-wired for a possible incoming tenant. When the flat was let, the new tenant insisted on the wiring being disconnected and gas installed. A short time previous to his taking the flat, his house had been burnt out through a wiring fault; and he determined that henceforth he would never live in premises where the electric light was installed. "Electrical enthusiasts may look upon these as isolated cases; but we, who are behind the scenes, know that they are fairly frequent." Mr. Russell has issued his warning; but the central station engineer of to-day wants lighting custom—and for more than one reason.

The parliamentary prospects for the coming session in relation to electric lighting, power, and traction are not great. Totalling up all the Orders and Bills, there will only be 72, of which al

but 27 will refer to tramways and railways. In Electric Lighting Orders, there are six local authority promoters and eight company; and in Electric Lighting and Power Bills, there are six local authority promoters and seven company. One of the Orders is being promoted by the Skelmorlie and Wemyss Bay Gas and Electric Supply Company; and in the Bills, the Aldershot Gas and Water Company, the Yorktown and Blackwater Gas Company, the Wells Gas Company, and the Biddulph Gas Company are among those seeking electricity powers. One interesting Bill will be that referring to the Bath Corporation electric supply undertaking. It will be remembered that there has been considerable bargaining, till an agreement was struck, between the Bath Corporation and (through Mr. Ernest Schenk) the Somerset and District Power Company for the transfer of the undertaking to the latter. The Board of Trade have now refused their sanction to the scheme, though the Corporation would be utterly glad to get rid of their old failure in municipal trading. The grounds of the Board's refusal are that it is contrary to their practice to allow an undertaking transferred to be charged with any profit to the transferer, and that they are not aware that the Corporation have any power to contract their successors out of the option of purchase conferred by the Electric Lighting Acts. In consequence of this, Mr. Schenk has taken the necessary steps to promote a Bill in the coming session for effecting the purchase.

ELECTRICAL COOKING.

In the "Electric Supply Memoranda" last week, reference was made to Mr. W. R. Cooper's paper, on "Electrical Heating and Cooking," read before the Institution of Electrical Engineers. There was a long discussion on the paper; and there have also been written contributions. One of the most interesting is that of Mr. F. A. Wilkinson, the Engineer and Manager of the Marylebone Borough Council electricity undertaking. It appears that it is his experience that manufacturers of electrical, gas, and coal cooking apparatus cannot supply and substantiate any definite practical figures, and the chefs of various restaurants that have been approached seem to have only the haziest of ideas on the subject of costs. It is in consequence of this that wherever possible his department is instituting comparative tests under practical conditions; but it is by no means an easy task to persuade suitable firms or persons to allow an experiment. Mr. Fleming, of Fleming's Restaurants, Limited, has given every possible assistance. There is no doubt, in Mr. Wilkinson's mind, that Mr. Fleming is correct in saying that at full capacity the electric grill would be cheaper than gas; and, from an intimate practical knowledge of it, he has no hesitation in saying that such a grill split up into a number of sections, instead of only two, would, at 1d. per unit, be cheaper than the gas-grill against which it was tested. Electric ovens, as comparatively large consumers of current, are of particular interest; and the following details of a test carried out for two weeks under really practical conditions in a large restaurant, will perhaps be useful:—

Article Cooked.	Weight.	Time to Cook.	Units Consumed.	Units per Lb. of Meat.	Cost at 1d. per Unit.
	Lbs.	H. Min.			s. d.
Meat	41	4 10	8	0·195	0 8
Do.	48	6 0	13	0·271	1 1
Do. (pork)	43·5	5 30	11	0·252	0 11*
Do.	41 5	4 0	9	0·216	0 9†
Do.	32	5 0	9	0·281	0 9
Do.	41	5 30	9	0·219	0 9
Do. and two puddings	22	4 0	8	0·363	0 8
Do. do.	25	4 30	9	0·360	0 9
Meat	77	7 0	14	0·181	1 2
Do.	53	6 20	11	0·207	0 11
Do.	87	7 30	14	0·161	1 2
Do.	41	5 0	10	0·243	0 10
Do.	38	5 0	9	0·237	0 9
Do.	58·5	7 40	13	0·222	1 1
Do.	40·5	4 0	11	0·271	0 11

* Half heat after 4·25 hours. Average units per lb. = 0·216.
† Half heat after 1·5 hours. Average cost per lb. = 0·216d.

When working at full capacity, so far as has been ascertained, the cost at 1d. per unit is certainly not above that of gas. The nearest comparison Mr. Wilkinson has been able to make is with a large and efficient gas-oven of really first-class make. This oven consumed 400 cubic feet of gas per hour at a cost of 1s. 2d., and had a capacity of 500 lbs. of meat. Taking the capacity of the electric oven at 80 lbs., the cooking cost was practically the same. Mr. Cooper, in his paper, laid emphasis upon the bad impression that inefficient or unsuitable cooking apparatus produced. Mr. Wilkinson has found this borne out in several cases. Manufacturers are, of course, well aware of this; and there is no doubt they are improving their goods every day. Still, there are one or two points in the average piece of apparatus to which, as a user, Mr. Wilkinson calls attention. Taking ovens, in the majority on the market the loss of heat by radiation is very large; and the usual lagging arrangements are entirely inadequate. Consumers object to this radiated heat, and in some cases it has been sufficient to turn the scale against electricity. A first-class gas-oven is in this direction far ahead of most, if not all, of its electrical competitors. Bad heat distribution in the oven is another point upon which there has been complaint, and inaccessibility and neglect of small details which enhance convenience have also been mentioned. In many similar directions there is distinctly room for improvement. The same may be said of gas and coal apparatus, which in many instances are obviously capable of great improvement, and there appears every likelihood that the cost of gas cooking will be materially reduced by means of more efficient apparatus if there is real competition. These remarks may be read in conjunction with our comments last week.

GAS SUPPLY CLASSES AT WESTMINSTER.

When notifying, about a couple of months ago, the appointment of Messrs. P. J. Smithers and H. Rothwell as Joint Teachers in the subject of "Gas Supply" at the Westminster Technical Institute of the London County Council Education Department, the hope was expressed that these new classes—this is the first year the subject has been included in the Institute's programme—would be as successful as there was every reason to anticipate would be the case. This hope and anticipation have been fulfilled; for the class—which is held on Monday evenings—already numbers between forty and fifty, and there has so far been an average attendance of more than thirty students. This proves that the classes are filling a want; but the usefulness of the Institute as a garden wherein may be gathered the fruit of knowledge of the gas industry is likely to be of an even more extended character. In addition to the classes referred to, there is the scheme to be carried out by the Gaslight and Coke Company in conjunction with the County Council. Under this, a certain number of boys selected from the day schools will go to the Institute for theoretical training and to a special shop placed at their disposal by the Company for practical work—as already explained to the shareholders by the Governor (Mr. Corbet Woodall). In the event of the boys turning out satisfactorily, the Company will later on undertake to find them positions.

The Institute, which is located in Vincent Square, was established in 1890 by the Baroness Burdett-Coutts, and was presented by her to the County Council in 1900. But the original premises have now been enlarged by the addition of a new building which affords more ample space required for the very large number of art and technical classes which it has been found desirable to hold. A tour of the premises now, under the guidance of the Principal (Mr. J. Stuart Ker, B.Sc.), is sufficient to convince one—if any such proof be needed—of the excellence of the facilities which now exist for enabling practical workers to improve their knowledge of whatever particular branch of industry they may have elected to follow. There are twenty class-rooms and studios in the new building, and about ten in the old one; and altogether there are 530 evening and about 60 day students, while the accommodation is ample for a much larger number. Among others, there are excellently fitted up painters', masons', and carpenters' shops. Cabinet making and wood carving are also carried on; and there is a large drawing-office. In all cases, the material on which the pupils work is found for them; but if they desire to take away anything they have made, then they are expected to pay for the material used. The two top floors are set aside for art work, a number of the students for which come from Doulton's works. The practical side of the art section—which is the portion of the Institute which is kept going both day and evening—may be illustrated by the fact that one of the pupils has been turning his attention to the designing of gas-fittings. Much of the lighting, it is noted, is carried out by means of inverted arc lamps, the illumination from which is reflected down from the ceiling; while in other rooms filament lamps are employed. In every room, however, there is to be seen a gas-bracket, the bye-pass of which is always kept on.

To come to the portion of the Institute's programme in which "Journal" readers are more particularly interested, it may be remarked that at the bottom of the building there is a plumbers' workshop, which has been in operation for a long time. The plumbers use it two nights a week; and on another day it is set apart for the practical working portion of the new classes on gas supply. Here there is ample scope for carrying out drilling and tapping and other operations connected with main work; and cutting and screwing is also taught, together with gas-fitting from the main right up to the point of ignition, in all various branches. A good deal of gas apparatus is to be seen in this shop; and there are also various gas-heating appliances in other parts of the building—both Messrs. Fletcher, Russell, and Co.'s and the Richmond Gas Stove and Meter Company's manufactures being represented. The gas students have a three-quarters-of-an-hour lecture in one of the class-rooms, and then they proceed downstairs for the practical part of the instruction; the material on which these pupils operate being lent by the Gaslight and Coke Company. A glance at the methods adopted in the Institute convinces one that everything there is made as practical as possible.

By an order of the Local Government Board, made under the Alkali, &c., Works Regulation Act, 1906, Mr. Robert Dexter Littlefield has been appointed an Inspector under the Act, as from the 1st prox., subject to the direction of the Chief Inspector, Mr. R. Forbes Carpenter.

THE RIGHT TO DEMAND SHAREHOLDERS' LISTS.

By H. D. Ellis.

The following observations have been prompted by a perusal of the case of *Davies v. The Gaslight and Coke Company*, in the High Court of Justice, Chancery Division, in which case judgment was delivered on the 3rd inst. A full report of the case appeared in the "Journal" for the 8th inst. The object of the writer is to endeavour to show that, upon the true construction and interpretation of the Companies Clauses Act, 1845, the defendant Company were not bound to supply the plaintiff with a copy of the "Shareholders' Address Book."

In delivering his judgment in favour of the plaintiff, Mr. Justice Warrington said: "This action is brought for the purpose of enforcing this right, which is given to him by the 10th section of the Companies Clauses Act, 1845. This section enacts that, 'in addition to the Register of Shareholders, the company shall provide a book, to be called the Shareholders' Address Book . . . and every shareholder may peruse such book gratis . . . and may require a copy thereof, &c.' I think it is clear that the right which is conferred is one which is conferred upon the plaintiff by reason that he is the holder of stock in the Company." It is upon this declaration of the learned Judge that the writer desires with all respect, to take issue.

The right conferred by section 10 is admittedly a right conferred upon "every shareholder." No part of the capital of the defendant Company consists of shares. The whole of the share capital has been converted and consolidated into a general capital stock. The plaintiff is not a shareholder; he is a stockholder. What is the difference?

For convenience of reference later on, copies of the enactments of the Companies Clauses Act, 1845, relating to Registers of Shareholders and to Registers of Stockholders, are here set out:

Companies Clauses Act, 1845.

As to Shares.

9. The company shall keep a book, to be called the "Register of Shareholders;" and in such book shall be fairly and distinctly entered, from time to time, the names of the several corporations, and the names and additions of the several persons entitled to shares in the company, together with the number of shares to which such shareholders shall be respectively entitled, distinguishing each share by its number; and the amount of the subscriptions paid on such shares, and the surnames or corporate names of the said shareholders shall be placed in alphabetical order; and such book shall be authenticated by the common seal of the company being affixed thereto; and such authentication shall take place at the first ordinary meeting, or at the next subsequent meeting of the company, and so from time to time at each ordinary meeting of the company.

10. In addition to the said Register of Shareholders, the company shall provide a book, to be called the "Shareholders' Address Book," in which the secretary shall from time to time enter in alphabetical order the corporate names and places of business of the several shareholders of the company, being corporations, and the surnames of the several other shareholders with their respective christian names, places of abode, and descriptions, so far as the same shall be known to the company; and every shareholder, or if such shareholder be a corporation the clerk or agent of such corporation, may at all convenient times peruse such book gratis, and may require a copy thereof, or of any part thereof; and for every hundred words so required to be copied, the company may demand a sum not exceeding sixpence.

As to Stock.

(63.) The company shall from time to time cause the names of the several parties who may be interested in any such stock as aforesaid, with the amount of the interest therein possessed by them respectively, to be entered in a book to be kept for the purpose, and to be called "The Register of Holders of Consolidated Stock;" and such book shall be accessible at all seasonable times to the several holders of shares or stock in the undertaking.

(64.) The several holders of such stock shall be entitled to participate in the dividends and profits of the company, according to the amount of their respective interest in such stock, and such interests shall, in proportion to the amount thereof, confer on the holders thereof respectively, the same privileges and advantages, for the purpose of voting at meetings of the company, qualification for the office of directors, and for other purposes, as would have been conferred by shares of equal amount in the capital of the company, but so that none of such privileges or advantages, except the participation in the dividends and profits of the company, shall be conferred by any aliquot part of such amount of consolidated stock as would not, if existing in shares, have conferred such privileges or advantages respectively.

It is true that by the interpretation clause of the Act the word "shareholder" means shareholder, proprietor, or member; but it is also true that wherever in the Act, or in the subsequent Act of 1863, a distinction between shareholders and stockholders may or has to be drawn by reason of the diversity of the nature of their holdings, such distinction is drawn. Both classes of proprietors are severally named; and the expressions "shareholder" and "stockholder" are not synonymous and convertible terms. Thus, in section 63 of the 1845 Act, rights are conferred upon "the several holders of shares or stock in the undertaking"—recognizing the fact that the capital of a company may be, and frequently is, composed partly of shares and partly of stock. And in section 28 of the 1863 Act the right to inspect and peruse the Register of Debenture Stockholders is conferred upon "every shareholder and stockholder of the company." It must be constantly borne in mind that stock in a company is a holding upon which the whole liability has been fully paid up by the proprietor; whereas a share is a holding which may be, and often is, allowed to remain only partly paid and with a future liability attaching to it. The point is well illustrated by section 36 of the Act of 1845 (Remedies against Shareholders), which confers upon execution creditors the right to inspect the "Register of Shareholders." Why? In order that they may ascertain what amount, if any, is still outstanding and unpaid upon the shares, and therefore liable to be proceeded against by the creditor. Here the words "Register of Shareholders" cannot possibly mean also "Register of Stockholders;" for, inasmuch as there is no outstanding liability upon stock, a right to inspect the Register of Stockholders would be useless.

In considering section 10 of the 1845 Act, it is of high importance not to lose sight of section 9, and to note that so carefully does the Act distinguish between the nature and aim and object of the "Register of Shareholders" and those of the "Shareholders' Address Book," that they are dealt with in two separate sections. In the first book are to be entered the names and additions of the shareholders and the number of the shares they hold; but no addresses, and no right of inspection is conferred. In the second book are to be entered the names and addresses, but not the number of shares; and a right of inspection is conferred. And this method of enactment is not a matter either of accident or chance draughtsmanship; a set purpose and meaning are apparent. It is of essential importance to the shareholder of partly-paid capital in an undertaking to have a knowledge of the character and financial stability of those by whom, together with himself, the capital is held; and to satisfy himself, if he can, that shares are not being unloaded on to men of straw, in order to evade payment of future calls. But no such consideration can possibly attach to stockholders. The undertaking has received payment in full from them; and their subsequent financial circumstances have no interest.

And so it will be seen that section 63 of the 1845 Act, which prescribes the keeping of a Register of Stockholders, has affinity, not to section 10, but to section 9 (names and holdings, but no addresses), with the addition of "accessibility," which is not contained in section 9. And why is this condition of accessibility imported into section 63? Because it is non-existent in section 9, and cannot be read into it; and what is necessary in the interest of the shareholder, as distinguished from the stockholder, is specially provided in a separate section—section 10.

The meaning of the word "accessible" is not defined in the Act; nor need it be defined. A common-sense construction readily suggests that every stockholder should have the right to see that his name and holding are correctly entered, and that every shareholder (if the company should have share capital as well as stock capital) should have the right to ascertain how much stock has been created and issued. In section 28 of the 1863 Act, which relates to debenture stock, the expression is "accessible for inspection and perusal;" and this would probably be the interpretation to be put upon section 63 of the 1845 Act. But surely not even the most violent distension and distortion of the word "accessible" can make it import and contain the precisely expressed provisions of section 10.

In the case of *Mutter v. Eastern and Midlands Railway Company* (decided twenty years ago), the Court of Appeal held that a right to inspect and peruse a Register of Debenture Stockholders carried with it a right to take copies. But that case was not on all-fours with this, and need not now be further considered. And even assuming that "accessibilty" in section 63 conferred a right to take copies of the Register of Stockholders, that book is not the "Shareholders' Address Book," and it contains no addresses.

Next Saturday, the second annual dinner of the Scottish Junior Gas Association (Western District) will be held in the "Argyle Arcade Café," Glasgow. Mr. Alex. Wilson, the Engineer and General Manager of the Glasgow Corporation Gas Department, and one of the honorary members, will occupy the chair. During the evening, Mr. T. H. Whitehead will be presented with the Association Medal for his paper on "Pumps: Their Construction and Use."

EXTENSIONS AT CIRENCESTER.

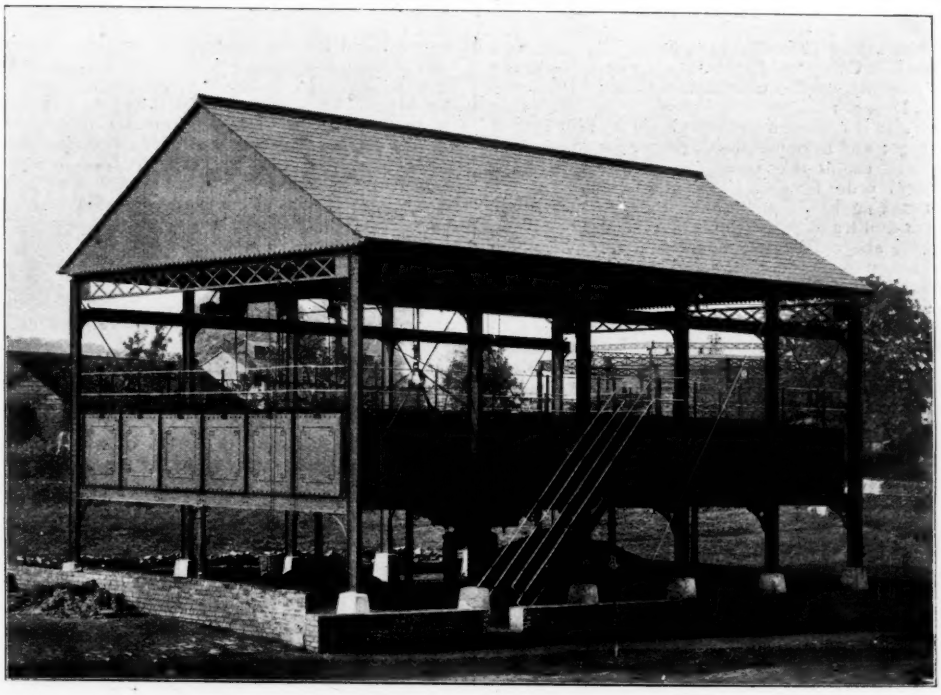
Up-to-Date Purifiers.

The steady increase which has favoured the Cirencester Gas Company for many years past recently led to their discarding the old water-lute purifiers which had been in use for many years and formed almost the last link between the old and the more recently built works. The Company are fortunate in possessing a large works area; and the Engineer (Mr. E. M. Beecham) was able to select an admirable site for the new purifiers, which, after full consideration, it was decided should be erected overhead.

The *pros* and *cons* of this system, where space is not limited, is often a matter on which opinion widely differs; but, with the more up-to-date systems of luteless covers, connectionless valves, and almost universal adoption of oxide purification, the overhead system of purifiers becomes more applicable to all works. The open space on the top of the boxes makes impossible all chance of explosion, or discomfort in changing oxide. The emptying of the oxide on to the purifying floor is done with a minimum amount of labour, and the purifiers can be examined, painted, and repaired at any time; while the connectionless Pickering valves put an end to all possible chokages or naphthalene deposits, and form an instantaneous indicator as to the order in which the purifiers are working. All these advantages, added to economy of space and initial cost, far more than compensate for the little extra trouble when filling the purifiers.

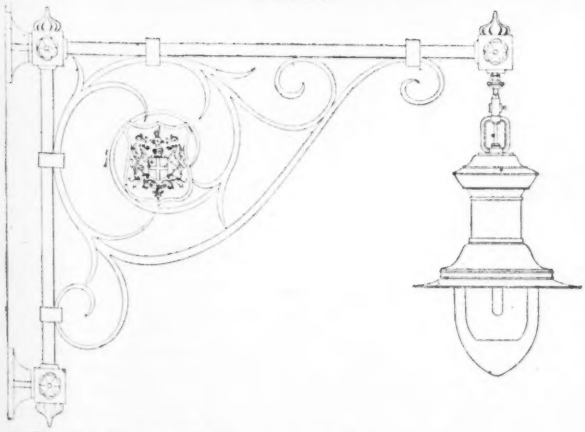
The purifier-house presents a handsome appearance, and is one of which any engineer might well feel proud. The purifiers were erected by Messrs. Willey and Co., Limited, of London and Exeter, and consist of four boxes, 25 feet by 15 feet by 5 feet deep, joined together in a square. There are three tiers of grids. The superstructure and floor are composed of steel joists; and the supporting joists are protected from the corrosive action of the oxide by concrete and cement bases. The covers to each purifier are constructed of steel, and held in position by cramps made to swing with handle nuts, and fitted with improved rubber jointing. The travelling lift is operated for lifting or travelling from the "gangway" formed by the top plates.

A 12-inch Pickering patent connectionless centre-valve is attached to the bottom plates of the purifiers, and fixed entirely outside. The whole of the valve discs and seats are fitted vertically, which makes it impossible for any deposit or foreign matter to settle on them to cause leakage. The absence of connections leaves the entire headroom free to make a clear and roomy oxide-shed. The roof is made of steel, and covered with "Duchess" slates.



The New Purifier House at the Cirencester Gas-Works.

THE HIGH-PRESSURE INVERTED GAS-LAMPS FOR FLEET STREET.



The New Design of Bracket for the High-Pressure Gas-Lamps in Fleet Street.

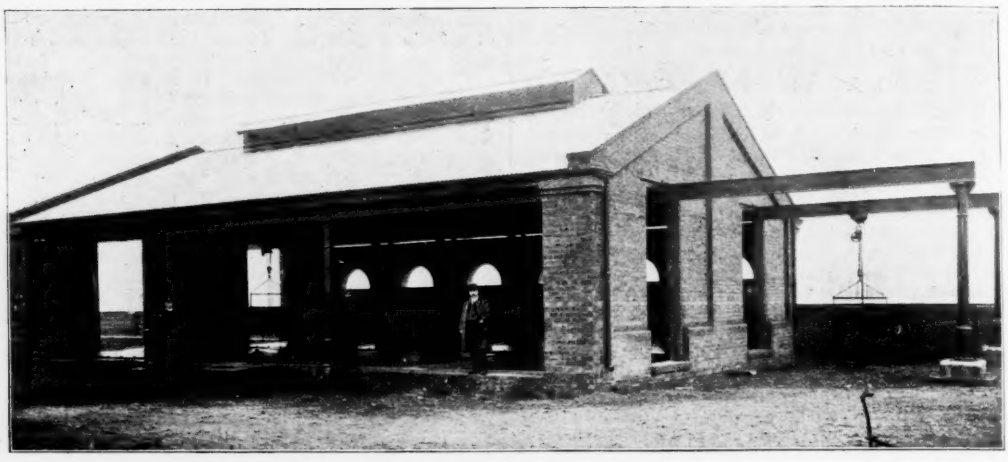
The design of the brackets for the Keith high-pressure gas-lamps for the lighting of Fleet Street has been materially varied. The first sketch (published on Dec. 1) showed a swan-neck bracket, of a not unattractive design; but the distance between lamp and house wall was somewhat restricted. The new bracket has been designed so as to carry the lamps further over the footpaths, but not so far as to run any danger from the road traffic. This extension will be much better from the light-distribution point of view; and in making the change, design and solidity (as will be observed) have suffered no loss. There is one thing that should be as much as possible guarded against in hanging the lamps; and that is, they should be kept well clear of existing bracket lamps, of which there are a fair number in connection with the newspaper offices of Fleet Street. There is another variation from the conditions previously described. It is intended to keep the mains constantly under pressure throughout the twenty-four hours, and supply consumers other than for public lighting. This will necessitate the discarding of the use of automatic lighters (operated by the raising of the pressure from normal at the compressor station), and the application of the ordinary flash and bye-pass cock.

CAMBUSLANG GAS-WORKS EXTENSIONS.

Opening Ceremony and Presentation.

Messrs. Robert Dempster and Sons, of Elland, have recently installed four new purifiers, 30 feet by 20 feet and 5 ft. 6 in. deep, capable of purifying 180 million cubic feet of gas per annum, at the Cambuslang Gas Company's works, Lanarkshire; and the opening ceremony was performed on Saturday, the 5th inst., by Mr. Robert Adam, J.P., the Chairman of the Company.

On behalf of the Contractors, Mr. J. W. Broadhead presented Mr. Adam with a beautiful silver rose-bowl, bearing the following



The New Purifier-House at Cambuslang.

inscription: "Presented to Robert Adam, Esq., J.P., Chairman of the Cambuslang Gas Company, Limited, on the occasion of the opening of new purifiers, by the Contractors, Robert Dempster and Sons, Elland, Dec. 5, 1908."

Mr. Broadhead said it had been a great pleasure to his firm to execute the contract; and he hoped the Company would continue to flourish to such an extent that before long they might find it necessary to place an order for even larger purifiers.

Mr. Adam, in thanking the Contractors for their gift, said there was no evidence of dull trade at the works. As a matter of fact, notwithstanding the abnormal trade depression through which the country was now passing, the Company's increase this year was larger than it had ever been before; and it was gratifying to know that this state of matters was likely to continue. The Company was formed fully half-a-century ago, by a number of hand-loom weavers, when Cambuslang was an obscure country village. It has been remarkably successful, especially since Mr. Robert Simpson was appointed Engineer and Manager, now some thirteen years ago. At that time the works were producing 19 million cubic feet per annum; and a 6-inch main of no great length was capable of conveying the supply for the entire district. The annual production is now 63 million cubic feet; and there is a 12-inch trunk-main running the whole length of the principal street. During the same period, the coal consumption at the works has increased from 1900 tons to close upon 7000 tons; and gas has been introduced to the most inaccessible parts of the parish.

The various improvements carried out by Mr. Simpson have involved an expenditure of £18,000 to £20,000; and notwithstanding this abnormal outlay, the annual dividends of the Company have averaged over 8 per cent. And what is even more remarkable, the cost of gas has been steadily reduced from 3s. 11½d. to 2s. 11d., which is the current price. A few years ago the County Council of Lanark planted an electricity works in the parish; but the Gas Company have more than held their own, despite the activities of the County officials.

Further extensions have been decided upon by the Gas Company, who quite justifiably claim that their works are among the most up-to-date in the country.

It is worthy of note that one of the founders and the only original shareholder and Director of the Company now alive, was present at the recent ceremony in the person of Mr. John Cockburn. Mr. Cockburn attended the meeting (over fifty years ago) at which it was decided to form the Company; and he is now the only connecting-link between the present and the past. Though bordering on ninety years of age, he braved the elements and journeyed from Glasgow to be present at the opening of the new purifier-house.

A CHAPTER OF ACCIDENTS AT DEVONPORT.

Misfortune continues to mark the course of the Devonport Corporation gas undertaking to a degree which is almost uncanny. Without going back to events which are now an old story, let us take as an illustration what appear to be the admitted facts of the history of the contract for automatic meter installations, now being discussed with so much warmth.

It is certainly true, because the document exists, that in the original draft of the agreement drawn up by Mr. S. E. Stevenson, the then Engineer and Manager, there was a clause providing that the contract should be determinable on notice at the end of five years; and it is also indisputable that in the course of the negotiations this clause was struck out, so that the agreement as completed was for a term of ten years. How or why the notice clause went, is the question in dispute. That the agreement was "revised" by a Sub-Committee of the Gas Committee is shown by a note written on the deed itself; but of the meeting, and the subsequent proceedings with reference to the agreement, there is no record at all. Mr. Stevenson remembers that the late Mr. H. A. Willey attended the meeting of the Sub-Committee and persuaded them to strike out the clause. No minute was, however, made of the meeting; and, strangely enough, neither the Chairman of the Gas Committee at the time nor the members of the Sub-Committee have any but the vaguest recollection of its having been held. The agreement in its final form appears to have been sent to a number of gentlemen who did not read it. By some mischance, it was never laid before the Gas Committee as a whole, nor does it seem to have had the direct approval of the Town Council. It was nevertheless signed by the Mayor, and duly sealed. A book is kept for the registration of deeds which receive the official seal, but the book is now missing. Was ever such a strange chapter of accidents? It seems unnecessary to say the Mayor did not read the agreement before signing it. His excuse is that it is not the business of a Mayor to inquire into the exact effect and scope of the documents put before him for signature, and that the Town Clerk must be trusted to see that they are in proper order and in accordance with the wishes of the Council. This is no doubt a correct, or at least common, view of the measure of responsibility borne by the nominal head of a Municipality and its chief official. Life would hardly be worth living for the ordinary Mayor if to his other duties were added the task of perusing (and understanding) all the legal technicalities of every deed he had to sign.

It is strange to see how everyone who might have read this agreement carefully refrained from doing so. They might have been officials of the German Foreign Office, passing on from one to another the responsibility for the record of some new indiscretion of the Kaiser. There is this to be said for them, that, if they had read the agreement, they might not have realized the importance of the clause which had been deleted. Unfortunately for the gas undertaking, it proves to have been of great financial interest. For the first five years of the contract, the conditions were in favour of the Corporation. Messrs. Willey and Co. put in the installations for a sum agreed upon, and maintained them without further cost to the Corporation. In the second five years, however, the Corporation are to pay for maintenance a sum which, on the basis of the present number of installations, amounts to upwards of £2000 a year; and, if an average rate of increase is maintained, it will in the last twelve months exceed £3000. This is obviously a serious burden for an undertaking whose net profit only amounts to about one-fourth of it. However, the agreement and its effect are still matters of discussion, and some way may be found out of a situation which is decidedly awkward for those whose business it is to conduct the undertaking successfully. It is not the least unpleasant feature of the revelation of the nature of the agreement that it has involved the Corporation in squabbles, not only with gentlemen who were in the service of the Corporation five years ago, but with others who had nothing to do with the drawing up and the execution of the document. Someone—or possibly several people—blundered then; but this hardly seems a sufficient reason for the severance now of the friendly relations which had existed between the former Chairman of the Gas Committee, Alderman Hornbrook, and the recently retired Engineer and Manager, Mr. J. W. Buckley. It is certainly unfortunate that the matter arose at this particular moment, for it had the effect of casting a cloud over Mr. Buckley's departure from Devonport, though he had not gone to the town until the agreement had been in existence for some eighteen months.

Mr. Alfred Colson, the Gas Engineer and Manager to the Leicester Corporation, who, it may be remembered, was one of the Local Secretaries for the meeting of the British Association held in the town last year, is preparing an album of extracts, reports, photographs, &c., for presentation to the library of the local Literary and Philosophical Society.

ASSOCIATION OF WATER-WORKS ENGINEERS.

The Winter Meeting of the Association was held last Friday and Saturday at the apartments of the Geological Society, Burlington House, W., under the presidency of Mr. HENRY E. STILGOE, M.Inst.C.E., the City Engineer of Birmingham. There was an exceptionally large attendance for a winter meeting.

The SECRETARY (Mr. Percy Griffith) read the minutes of the annual general meeting held on June 26 and 27 in Birmingham; and they were confirmed.

Dr. Mill on the Measurement of Rainfall.

The PRESIDENT, in calling upon Dr. Hugh R. Mill, President of the Royal Meteorological Society, and Director of the British Rainfall Organization, to deliver a lecture on "The Measurement of Rainfall," remarked that the sincere thanks of the members were due to so eminent an authority on this subject for coming forward in this manner.

The lecture was delivered extempore; and was plentifully illustrated by instructive lantern slides. The following is a summary of it.

All water on the land comes from rain, and the accurate determination of rainfall is the necessary basis of all work which has to do with the utilization or control of natural water. The determination involves (1) the measurement of the actual amount of rain which falls on the land, (2) the computation of the average fall for a long period, and (3) the allowance to be made for evaporation and other causes of loss in order to arrive at the amount of rainfall available for supply. The first is the most important of the three; and as it is still subject to a good deal of misconception, it is dealt with in the greatest detail.

In measuring rainfall, the simplest instruments are the best. Where it is possible, readings of rainfall should be taken daily at 9 a.m.; but valuable results are also obtainable from readings made once a month, or in some cases even less frequently. It is important that water resulting from every form of precipitation should be taken into account. Hence snow, dew, frost, and hail must be collected and measured as well as rain. For this purpose, the rain-gauge should have a deep vertical rim, as in the Snowdon (5-inch) or Meteorological Office (8-inch) pattern; and the mouth of the gauge should be level, and stand 1 foot above the surface of the ground. Many obsolete or unsatisfactory forms of rain-gauge are on the market; and as they are frequently more expensive than the better and simpler forms, they are often purchased in the belief that they are on that account the more accurate. Cases have occurred of records 50 per cent. in excess resulting from the use of a bad gauge. For monthly readings, a deep-bodied form of gauge is best; and the Bradford pattern is the most convenient.

When a rain-gauge is placed in too exposed a situation or raised on a pole or wall, eddies set up by the wind reduce the catch of rain by about 1 per cent. for every foot above 1 foot up to about 10 feet; above that height the amount of loss is erratic. As the amount of loss is not constant, but varies with the force of the wind, this average correction can only be applied to the average of a series of years, and not always then. On moorlands or mountains, rain-gauges should be protected from the sweep of the wind by a low circular wall or fence about 2 feet high and 8 feet in diameter, with the gauge in the centre. Some mountain records are very misleading on account of the small catch due to over-exposure. Undue shelter by the proximity of either buildings or trees is equally objectionable, and must be carefully avoided.

The method of entering the rainfall is more important than is commonly thought. The reading taken at 9 a.m. should, to ensure uniformity, be entered to the previous day. This is done by an overwhelming majority of observers, and the neglect of the rule may cause serious discrepancies in the records of the relative wetness or dryness of consecutive months or even years. The advantage of daily over monthly records lies not only in the importance of knowing the daily fall, but in furnishing an invaluable means of checking the correctness of the readings. Mistakes happen more frequently in reading monthly than daily gauges, because the measuring-glass has to be filled more frequently, and a slip may easily occur in counting. Such a slip can usually be detected and corrected when it can be traced to a particular day by comparison with a neighbouring daily record. Hence a group of several neighbouring gauges read daily by different observers may be relied upon, when critically compared, to yield correct records. All observers may make mistakes, especially those who stoutly affirm that there is one exception. There are still many parts of the British Isles totally without rain-gauges; and new records are wanted in order to make it possible to map the monthly and annual rainfall in most of the counties of England, and all the counties of Wales, Scotland, and Ireland. Rules for observing rainfall, and forms for recording it, are sent gratuitously on application to the British Rainfall Organization, No. 62, Camden Square, N.W.

In order to obtain the average rainfall of a place which shall not be disturbed by more than 1 per cent. by the addition or withdrawal of the driest or wettest year likely to occur, the mean of at least 35 consecutive years must be taken; and even then if the wettest probable year were added and the driest probable withdrawn the resulting disturbance would be rather more than 2 per cent. Shorter records must be reduced to their average value by reference to some neighbouring long record—a process full of pitfalls for the unwary. In no case can averages for different periods at different places be combined in order to determine the rainfall of an area.

Observations on evaporation are still few and often very unsatisfactory; and it is most desirable that they should be increased in number and rendered more strictly comparable. Measurements of river-flow and the run-off from catchment areas require to be largely increased and systematized before the natural laws regulating the relation of rainfall to run-off can be established on a scientific basis.

In the opinion of the lecturer, there ought to be a systematic survey of the amount of water available for supply and power in the British Isles—a task which would involve a great increase in the number of rainfall observations in remote places.

The PRESIDENT said it gave him great pleasure to propose a hearty vote of thanks to Dr. Mill for his interesting and instructive lecture. It was a subject in which they all took the greatest interest. The eminent lecturer had pointed out to them the necessity of providing great numbers of rain-gauges, and to see that they were put in suitable positions and records taken and properly registered. Most of those present knew that rainfall records, like every other record that was badly made, were worse than useless. As to the position of the gauges, he ventured to think there were many members to whom this lecture had been particularly instructive, because they had not all had the opportunity of observing the necessity of protecting the gauges. One word as to the early rain-gauge at Townley Hall. He found in Dr. Plott's "History of Oxfordshire," published in 1676, some reference to the rain-gauges kept by Sir Christopher Wren. Perhaps Dr. Mill might find it interesting, if he had not this information, to look it up. It would also be useful if Dr. Mill would urge upon his observers the necessity of establishing percolation gauges. There were too few about the country; and he was quite sure there was all too little known of the percolation of rainfall.

Mr. R. ASKWITH (Weardale and Consett Water Company) said it was a great pleasure to second the vote of thanks to Dr. Mill for his extremely interesting lecture. It was always a pleasure to listen to an enthusiast on topics of practical and scientific interest. He (Mr. Askwith) had been a recorder of rainfall for about 35 years; and he should tremble each year when he sent in the records now that he knew they were going through the "mill." (Laughter.)

The motion was heartily agreed to.

Dr. MILL acknowledged the vote, and then thanked the members collectively and individually for the admirable rainfall records they sent to him. The records were carefully checked; and if there were any present who had never had them returned, they might feel fairly safe that the records were pretty well made. Occasionally the figures sent were near approximation, and the observers did not hear anything about them; but if anything very wrong was detected, the observer invariably heard about it. Almost as invariably—perhaps one case out of 1000—no exception to this was made. The observers took it in very good part. He could not say how much the work of compilation and calculation of rainfall was simplified by promptness and punctuality in sending in the records. The work had improved in this respect during recent years; and it had been improved in the matter of taking the records every day, and at the proper hour. Comparing the work this last year

with twenty years before, it was striking how much they were able to do in the way of dissection that Mr. Symons could not attempt to do before. The observations were going on steadily improving. He should like to take this opportunity of remarking that it seemed to him it was a very important thing that regular records not only of rainfall, but of run-off from the land should be kept for every river in the country —not only for those works where the water was collected for the purpose of being utilized, but for every river not at present utilized. The question of the water supply of the British Isles would, in the course of a few years, become a very important one indeed; it would become absolutely vital. And from what he foresaw, it would be absolutely necessary for some authority to insist upon the exact registration of the total water income and the total amount that was available for expenditure. It was really quite as important as looking after the national exchequer.

Papers and Discussions.

The papers read and discussed during the remainder of Friday's sitting and the following morning were:

"The Water Supply of Hythe, Kent," by Mr. CHRISTOPHER JONES.
"A Short Account of a Water-Borne Outbreak of Typhoid Fever," by Professor W. R. SMITH, M.D., D.Sc., F.R.S.,Edin.

These will be dealt with in early issues of the "JOURNAL."

The President explained that Mr. C. F. Gettings, who was down for a paper on "The Teignmouth Moorland Water Scheme," was seriously ill; so that his paper would not be forthcoming.

On the motion of the PRESIDENT, seconded by Mr. H. ASHTON HILL (South Staffordshire Water-Works Company), a hearty vote of thanks was passed to Professor Smith and Mr. Jones for their valuable and interesting contributions.

Premiums for Papers.

The PRESIDENT announced that the Council had decided during the coming year to offer premiums for papers. He made this announcement at the present time, so that those who intended to read papers might have an early opportunity of preparing them. It was desirable that papers for the summer meeting should be in the hands of the Secretary by the end of April, and for the winter meeting by the end of September. This was necessary, as they had to be carefully read and edited, drawings checked, and so forth, and then prepared for the printers. There would be three premiums offered for such papers as the Council considered worthy. One would be of the value of £10; and this would be given in the form of books or instruments, just as might be selected by the successful author. This premium would be for a paper devoted to research work, or rather for a paper preferably entailing research work on a subject allied to water engineering or to water supply. The other two premiums would be of the value of £5 each, given similarly in books or instruments.

Mr. EASTON DEVONSHIRE (London) said there was one omission in the President's statement. He had not explained that the £10 was a prize that he himself was offering this year, and for special purposes. He thought it only right the Association should know this. He knew the members would be grateful to the President, for he believed it would be of great value, especially as the prize was to be for special research work.

Registration of Plumbers.

Mr. PERCY GRIFFITH initiated a discussion on the "Registration of Plumbers as Affecting Water Authorities." Several members took part in it. [The report is deferred.]

Election of Office Bearers and Additions to the Roll.

The PRESIDENT nominated Mr. William Watts, jun., and Mr. W. Shaw as Scrutineers; and they were appointed.

Later in the sitting, these gentlemen reported that their scrutiny of the balloting-papers showed that the following gentlemen had been elected to office:

President.—**Mr. Robert Askwith, of the Weardale and Consett Water Company.**

Vice-Presidents.—**Mr. W. H. Humphreys, of York; and Mr. Edward Sandeman, of the Derwent Valley Water-Works.**

Ordinary Members of Council.—**Mr. A. B. E. Blackburn, of Sunderland; Mr. Easton Devonshire, of London; Mr. G. Greenslade, of South Hants Water-Works Company; Mr. Frederick Griffith, of Leicester; Mr. H. Ashton Hill, of South Staffordshire Water-Works Company; Mr. William Matthews, of Westminster; Mr. T. Molyneux, of Stockport; Mr. J. S. Pickering, of Cheltenham; Mr. C. Clemesha Smith, of Wakefield; Mr. R. H. Wyrill, of Swansea.**

The following gentlemen were added to the membership roll:

Members: **Mr. W. C. Hawke, of Dover; and Mr. G. N. Yourdi, of Westminster.**

Associate-Members: **Mr. G. F. Andrassy, of Chelmsford; Mr. H. W. Apted, of Torquay; Mr. R. H. Millson, of Braintree; Mr. R. A. Ryves, of Chepâk, Madras; Mr. H. F. Sawden, of Kimberley; Mr. R. A. Skelton, of Sandgate, Kent; Mr. W. M. Thynne, of Colombo, Ceylon.**

These will be dealt with in early issues of the "JOURNAL."

It was also announced that Mr. Cecil H. Roberts, of Southampton, had been transferred from the list of associate-members to that of members.

The Next Meeting.

The PRESIDENT remarked, regarding the election of office-bearers, that the President-Elect, Mr. Robert Askwith, had been called away to attend another meeting. He desired him (the President) to thank, on his behalf, the members for the honour conferred on him, and to say that he would extend a very hearty welcome to the Association at Durham in the summer.

Votes of Thanks.

On the proposition of the PRESIDENT, seconded by Mr. EASTON DEVONSHIRE, the thanks of the members were tendered to the Council of the Geological Society for the use of their rooms for the meeting, and to the Scrutineers of the balloting-lists for their services.

This concluded the proceedings.

MONUMENT TO BUNSEN AT HEIDELBERG.

The current number of the "Chemical News" contains an interesting account, by Mr. Nicholas Knight, of Cornell College, Iowa, of the ceremony of unveiling the monument to Robert Bunsen at Heidelberg—the old University city on the Neckar in which so much of his life-work was done. The monument is the outcome of an appeal made some four or five years ago to the members of the German Chemical Society for subscriptions; and it was generously responded to by admirers of Bunsen throughout the civilized world. With some assistance from the City of Heidelberg, where Bunsen laboured so successfully for 37 years (from 1852 to 1889), a sum of 70,000 marks (£3500) was raised and the work put in hand. The monument, which was unveiled on the 1st of August, consists of a life-size figure in bronze of the distinguished scientist, representing him as he appeared in 1859, about the time that he and Kirchhoff invented the spectroscope. In one hand he holds a manuscript, as if about to deliver a lecture. A flight of a few steps leads from the street to the monument. On each corner of the monument plot nearest the street is a colossal figure of white granite from the Black Forest—one representing the known sciences, and the other Science awaking. The monument is not far from the Heidelberg Chemical Laboratory, a part of which was constructed under Bunsen's supervision, and was afterwards added to by his illustrious successor, the late Victor Meyer. The designer of the memorial is Professor Volz, of Karlsruhe, and Mr. Knight states that "from an artistic standpoint it is a meritorious work."

The ceremony connected with the unveiling of the monument was simple, but interesting and impressive. Music was furnished by the city orchestra, conducted by Professor Grau. Professor Theodore Curtius, the Director of the Heidelberg Laboratory, and the successor of Bunsen and Victor Meyer, as a member of the Monument Committee, gave an interesting detailed history of the enterprise. Professor Bernthsen, representing the industrial chemists, spoke at length of the great debt that applied chemistry owes to the investigations of him to honour whose memory they were assembled. He spoke of Bunsen's contributions to industrial chemistry by the spectroscope, by his discovery of important technical analytical methods, by his work in volumetric analysis, by his studies in gas analysis, by his improved methods of iron production, and by his separation of various metals by electrolysis. The Mayor (Dr. Wilckens) accepted the monument in the name of the City. Representatives of the German Chemical Society and a score of similar organizations deposited on the monument laurel wreaths and other floral tributes suitably inscribed, as a mark of esteem for the man who so ably served his day and generation. Besides the scientific organizations, many of the German universities and technical schools sent their representatives and floral offerings to do honour to the occasion, which proved a notable day in the history of the city.

The ceremony was largely attended; several members of Bunsen's family being interested spectators. Some of the visitors wandered to the cemetery, and sought out Bunsen's grave. The monument is plain, and bears a simple inscription. Not far away is the granite block, almost overgrown with ivy, which marks the last resting-place of that other world-renowned scientist, Victor Meyer, the worthy successor of Bunsen.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Heating Water by Gas.

At a Meeting of the Association which took place last Friday evening, at the Cripplegate Institute, Golden Lane, E.C.—the President (Mr. W. J. Liberty) in the chair—a lecture was delivered by Mr. W. Briggs, on the "Production of Hot Water by Gas." A highly instructive evening was spent. Mr. Briggs is a practical man, who has his subject at his fingers' ends; and with the aid of numerous diagrams he lucidly explained to the members what, according to his experience, should and should not be done in the matter of fitting up apparatus for heating water by gas. The lecture was, however, essentially of a kind to be heard, and not read; and we will therefore here merely touch upon a few of the points introduced.

In the course of his travels, Mr. Briggs said, he had come across men who had really been a trifle fearful of attacking the question of heating a mass of water by gas—he did not know why. Perhaps after this meeting those present would be a little bit bolder in introducing the circulator. For heating baths, &c., of course, the geyser stood pre-eminent. But then there was more "fallow ground," as the President had called it, which might have been ploughed up, but had not been cultivated; and this was the circulating system of a house, when they had had the privilege of turning out a coal-range and installing a gas-range. There were plenty of circulators on the market of various types and sizes; but in the case of a house where it was necessary to heat up 300 gallons of water on the third floor, with a demand for ten baths in succession, there would be some hesitation in putting in some of the small-sized circulators they saw about. But many large houses in the West-end were really waiting for them to step in and say, "We can heat your water by gas. It is more convenient." There was, however, a great field open for circulators in small houses as well as in some large ones. The first thing that a fitter or inspector should bear in mind, when he entered a house with the idea of introducing a circulator, was to take the measurement of the existing cylinder or tank, whichever it might be, and cube it up, so as to ascertain how many gallons of water there were to deal with. Then he would ask for a circulator that would heat this water in a given time—thus throwing the responsibility on the makers. He had seen circulators get a bad name simply because they were inadequate to the work they were put to. The apparatus must be big enough; and the products of combustion should be carried up into the chimney. For new houses and flats, he recommended a circulator with a holding capacity of 25 or 30 gallons, to be placed in the basement, so as to dispense with flow-and-return pipes and with the storage tank. If builders would put these in, they would be the cheapest and most convenient method of heating water for baths and for culinary and domestic purposes. A separate installation for each flat would be more economical than having one large plant in a separate building, with men in attendance on it whether the water was required or not.

As to the selection of a circulator, there were, he said, many on the market. Some of them were fit for the scrap-heap—they did not do either the gas company or the fitter justice. It was difficult to know what to select; but a guarantee from the makers would secure everybody against a failure, so that there would be satisfaction all round. An important point was to get a circulator which, when fixed in the basement, would stand the pressure of the column of water—whatever it might be. The greatest enemy they had to deal with, however, was lime deposit. Cases he had come across in the City and outside clearly proved that, when water was raised to a certain temperature, lime was deposited; and it was quite necessary that the circulator should be so arranged that the fitter could undo a nut and clear out the deposit with a crowbar, without damaging the apparatus. It might require more heating, but a circulator made of $\frac{3}{16}$-inch iron plate, with steel tubing of No. 10 gauge, was a strong article. It was far preferable to the copper that was used.

Conservatory heating he said was another field which had not been well looked after. There were many heaters on the market; and with a little push, it might be proved that gas was far to be preferred to oil, which at 6d. or 8d. per gallon cost about three times more than gas did for heating. If they worked on the rule that 1 cubic foot of gas would heat 3 square feet of heating surface, the consumption did not come out very high. Of course, for big greenhouses coke would be much cheaper than gas; but for amateur work, the latter could not be beaten. It was a very simple method; there was no difficulty whatever about it. He said he had fitted up gas-heated steam-boilers (in places where coal or coke could not be used) of from $\frac{1}{8}$ to 3 H.P. In conclusion, he remarked that any information he could at any time furnish to the members would be freely given; he wanted to see the gas industry go ahead.

At the conclusion of the lecture a large number of questions were asked.

Mr. F. Ainsworth said he had expected to hear how much water a cubic foot of gas would heat, and to what extent, so that they could get at the cost of these circulators. He would like Mr. Briggs to address them at some future date on geysers.

The Hon. Secretary (Mr. J. G. Clark) remarked that, with regard to chalk deposit, Mr. Briggs had shown them specimens of this. It was, he thought, erroneous to say that carbonates were not deposited except on boiling the water. It was probable that practically the whole of the chalk would be deposited at (say) 140° Fahr., though it would take a longer time than by actual ebullition. The dissolved carbonates were present in the water as bi-carbonates, formed by the action of the carbonic acid and water upon the carbonate. If the carbonic acid was driven off, the insoluble carbonate was re-formed, and caused the deposit. This carbonic acid could be removed by moderate heating of the water, though not so rapidly as by actual boiling. It was therefore not surprising that they had carbonates deposited in circulating systems though the boiling point was not reached. In regard to the remarks regarding copper *versus* cast iron or steel for circulators, he would like to point out that where very soft water was met with, corrosion on the water side of a boiler would probably be greater with cast iron and steel than with copper.

Mr. Walter Grafton asked how many gallons Mr. Briggs took for a bath. Then nothing had been said with regard to the efficiency of his circulator, taking into consideration the kind of burner used. As to conservatories, in calculating the gas consumption necessary, did he take into consideration ventilation as well, because this would greatly affect the matter. How did he arrive at the capacity of the boiler with regard to the size of the house?

Mr. Briggs, in reply, said it stood to reason that a thin copper circulator would heat more quickly than a thick iron one; but the latter would last longer. As to consumption, he reckoned that a cubic foot of 18-candle power coal gas, of 660 B.Th.U., at 10-10ths pressure, would raise a gallon of water 50°. But this was not allowing anything for loss by radiation. He allowed for average baths. Products of combustion had caused him great trouble. People would run flue-pipes into the open air, and put things on top of them, which they called "cowls." For 1-inch pipe with a circulator, it was necessary to allow a cubic foot of gas for every 10 feet of pipe from the circulator to the storage tank. This was why he always arranged for as little loss of heat as possible by radiation. Flame contact varied according to the construction of the apparatus. With a tubular circulator it was quite possible to go within 3 inches of the bottom of the vessel; but with a flat surface, it was necessary to keep about 6 inches away. As to the capacity to be reckoned for a circulator in a private residence, the following figures had been supplied to him: Four taps and one bath, storage tank necessary 42 gallons. Six taps and two baths, storage tank 60 gallons. Eight taps and two baths, storage tank 85 gallons. Flow and return pipes, 2 inch. For exceptionally large private houses, with twelve taps and three baths, storage tank 160 gallons; flow and return pipes, 2 inch. Twenty taps and five baths, storage tank 200 gallons; flow and return pipes, $2\frac{1}{2}$ inch. Atmospheric and luminous gas-flames gave off the same heat; but as for heating water-vessels, luminous flames had to be kept from impinging on the heater, they naturally took longer to heat the water than atmospheric flames. For conservatories, the heater could be enclosed in an iron box inside the house; but the products of combustion were carried outside. If this were not done, almost the hardiest plants would be killed. He always dealt with products of combustion as if they were a deadly poison, both for plants and people. There was, of course, the matter of ventilating a greenhouse to be considered. Copper was very suitable for circulators; but there was the question of wear and tear. It was impossible to have a copper circulator as thick as the iron one to which he had referred, so it would not stand knocking about like the iron one, into which they could get a crowbar.

The President proposed a hearty vote of thanks to Mr. Briggs for his lecture, and said they would be pleased to hear him again on the subjects of products of combustion and geysers.

Mr. W. A. Barnett, in seconding, said that one point not touched upon was that it was very desirable in all hot-water installations to make sure there were no depressions in the pipes. They must have a continuous drop from the tank to the boiler, and also a continuous rise away from the boiler again. If it was necessary to depress the pipe, there must be an air-outlet. This was the sort of thing that gave a lot of trouble in gas-engine tanks. It was a pity that there were not more hot-water installations; but they should be put in in such a manner as not to give the user much trouble. It was not a very great stretch from fitting up a hot-water boiler to installing a small water-softening plant.

The vote was heartily accorded; and Mr. Briggs suitably acknowledged it.

Mr. Walter Grafton's Removal to Scotland.

The President remarked that the Association, as they were aware, was continually shedding itself of members, which, of course, was a very good thing, when one considered that it came about through promotion. The latest instance of this was Mr. Walter Grafton, who was with them that night, it might be for the last time—unless he visited them in London on some future occasion—owing to his having received the appointment of Assistant-Manager at Glasgow. As they knew, Mr. Grafton had been on the engineering staff at Beckton for many years; while his success as a lecturer on "Gas Manufacture and Supply" at the Regent Street Polytechnic was evinced by the large number of medals, money prizes, and scholarships gained, as well as by the high percentage of first-class passes. Many of those now present were

there as the result of his teaching; but the members generally knew him perhaps better as the Father of the Association. It was to this matter that he wished particularly to refer. If there had been no Mr. Grafton and no Polytechnic, there would, he made bold to say, have been no London and Southern District Junior Gas Association. He was the inception of it. He housed the Association for a long time, stuck to it through thick and thin, and, fortunately for it, became the first President—a position he retained for some three years. By remaining among the juniors as he had done, he had shown his earnest desire to assist in their advancement. On visiting Mr. Grafton's class-room a few days previously, he had seen written by the pupils on the blackboard, "We heartily congratulate you on your success at Glasgow;" and these words he now repeated on behalf of the Association. Mr. Grafton was now leaving them; and he (the President) felt sure the following resolution would meet with the cordial approval of the members:

> That this Association assembled in general meeting desires to congratulate Mr. Walter Grafton, of Beckton, upon his appointment as Assistant-Manager at Glasgow, under Mr. Alexander Wilson, and further desires to place on record the Association's indebtedness to him, as one of its founders and first President, which office he held for three successive years, and wishes him long life and health to carry on his new duties.

Mr. D. WINSLOW seconded, and remarked that they were all sorry to lose Mr. Grafton. There must have been hundreds of men who had attended his classes, and had got on successfully.

Mr. C. E. ROSEVEAR said Mr. Grafton had always done his best for him; it was only fair to say what he felt—that by his removal to Glasgow they were losing a very good friend. He, however, felt confident he would be appreciated in his new sphere.

Mr. F. AINSWORTH, who also supported the resolution, said that when he heard that Mr. Grafton had secured the position, he felt delighted—not that he wanted to see the back of him, but because he deserved one of the highest appointments that gas could give to him. He was sure there was not one of his students who had not the greatest respect for him and who did not look back with pleasure to the tuition received at his hands. Personally, he was sorry he was going; but they all rejoiced at the cause of his departure.

The PRESIDENT then read a letter he had received from Mr. W. B. Farquhar, the Engineer and Manager to the Ilford Gas Company, regretting his inability to be present, and asking the President to convey to Mr. Grafton his best wishes and congratulations on securing his new appointment.

The resolution having been carried with acclamation,

Mr. GRAFTON said he hardly knew how to thank the members. It had been a hard job to form the Association; but it had gone on well, and he felt sure that it had a successful career before it. He appreciated very much the great kindness that had been displayed towards him; and he would never forget it.

CORNISH ASSOCIATION OF GAS MANAGERS.

A Meeting of the Association was held at Truro last Wednesday, when a discussion took place on "Old Age Pensions," as regards the effect of the Government pensions on pensions already being paid by gas companies. The opinion of the members was that each case should be dealt with on its merits, and that they should not take undue advantage of the Government grant.

As to "Employees' Insurance," the President (Mr. S. J. Ingram, of Truro) pointed out that it was important that, as far as possible, the schedule inserted in insurance policies should cover the various grades of employment of their servants, as in the event of an accident occurring to one of their employees engaged on work not scheduled, there would be the danger of the claim being resisted by the Insurance Company. In the discussion which followed, it was generally agreed that it would be prudent to make the schedule as comprehensive as possible, and to also include a clause as follows: "All and every other class of labour incidental to the assured's business."

It was proposed by Mr. H. E. Riley, of St. Austell, and seconded by Mr. W. H. Sainsbury, of Truro, that a lady cook demonstrator and canvasser should be engaged for the next summer season, to advise consumers as to the proper use of gas cooking appliances, and generally promote gas for cooking and domestic purposes—the cost of same to be proportionately divided according to the length of time occupied in each town. The Secretary (Mr. H. H. Hoare, of Falmouth), was requested to advertise the post.

The President reported, on the subject of "Fire Insurance," that he recently had a fire in his coal-store due to spontaneous combustion—fortunately covered by insurance, owing to a special clause in his policy covering loss or damage of this kind. As but few fire policies contain such a clause, he advised the members to make sure their existing policies cover spontaneous combustion; and, if not, that the necessary clause be inserted forthwith.

The valuation lists of the Administrative County of London which come into force next year show that the gross value of parishes in the Metropolitan Boroughs is £47,707,974, and the rateable value £39,170,591; and of the City of London (including the Inner and Middle Temples), £6,655,097 and £5,503,755.

MIDLAND JUNIOR GAS ASSOCIATION.

The December Meeting of the Midland Junior Gas Engineering Association was held in the City of Birmingham Technical School last Saturday—the chair being occupied by Mr. JAMES HEWETT, the President.

THE LIVESEY MEMORIAL FUND.

The PRESIDENT, at the commencement of the business, explained that at a meeting held in London on Thursday last a proposition had been made and carried unanimously—"That a Livesey Memorial Fund be now opened, and that contributions to it be invited with the object of endowing a Professorship in Gas Engineering and Fuel at the Leeds University." The only point which the Association had to consider was whether they should make up an organized contribution among the members, or leave it to each individual member to subscribe to the general fund. He certainly thought that they as a Junior Gas Association—considering the proposal adopted was one of the most favourable of those made, as far as juniors were concerned—should take up an organized position with regard to the matter; and he would, to start the discussion, propose that the Secretary be instructed to write to the members drawing their attention to the fund being opened, and asking them to contribute to the list to be prepared by the Association.

Mr. A. HANCOX (Great Malvern) seconded the proposition.

Mr. R. S. RAMSDEN (Burton-on-Trent) supported the resolution, and suggested that it would perhaps be as well to get an idea as to what each member would be prepared to contribute.

The PRESIDENT said he did not think it necessary to have any fixed amount. It would be better for each to give according to his means. Of course, being juniors, they were not expected to give largely. Each should use his own discretion, and give what he felt inclined to. He was sure this would have been the wish of Sir George. Personally, he should be pleased to subscribe a guinea.

The motion was carried unanimously, and the list was handed round during the meeting—resulting in a sum of nearly £10 being promised by those present.

MR. J. H. DARRAH'S NEW APPOINTMENT.

The PRESIDENT next referred to the loss the Association were about to sustain of another prominent member—Mr. J. H. Darrah, who was about to leave England to take up an appointment with the Buenos Ayres (New) Gas Company, Limited. They were all sorry that he should go; but they would look forward to his return, and hope to have a paper from him at some future date. He was sure they would all join in offering Mr. Darrah hearty congratulations on his preferment, and wishing him every success in his new sphere.

MEASURING, TESTING, AND RECORDING.

Dr. W. B. DAVIDSON, the Chemist to the Birmingham Corporation Gas Department, and an honorary member of the Association, who met with a very cordial reception, then read a paper entitled "Measuring, Testing, and Recording." This, together with a report of the discussion to which it gave rise, will be found on p. 764.

RETORT-HOUSE WORK AND PRACTICE.

Discussion on the Paper Read by Mr. F. J. WARD, of Knowle.

At the October Meeting of the Association, Mr. F. J. Ward, of Knowle, read a paper on "Retort-House Work and Practice;" but as there was little time available on that occasion, the discussion was postponed until the next business meeting—which was last Saturday, the November fixture having been a visit.

Mr. C. H. EDMONDS (Windsor Street) remarked that the author of the paper had presumably set out to justify himself, as the manager of a small works, in not adopting such modern arrangements as tar-towers, retort-house governors, &c., and he had politely thrown out a challenge to them to prove him wrong. He, however, placed them in an initial difficulty by refraining from stating the actual capacity of his retort-house. The only information he could discover, apart from the annual make, was that there were occasions when only one or two retorts were charged. Now the most enthusiastic admirer of these innovations would hardly suggest their adoption for only two or three retorts. But what might be perfectly justifiable on a small works of two or three beds of retorts, was not necessarily the most economical practice for a works of (say) thirty or one hundred beds. He thought that Mr. Ward was justified in his action; but while he did not wish to criticize his system, he strongly objected to such statements as the following: "The majority of those who have discarded the old style of plant have done so to cover up some very bad results." "I have been tempted to say that they vow that they [retort-house governors] cure evils which do not exist; but I will be charitable, and refrain. I fear that at the works where they have been adopted, there must have been some very faulty working or loose screws." Perhaps Mr. Ward would justify these assertions. He (the speaker) did not propose taking up the cudgels on behalf of tar-columns, retort-house governors, &c.

—a perusal of the pages of the "JOURNAL" would show that their value was far from imaginary—but he would like to consider a few of the statements in the paper. The author had made a brief reference to the question of stopped pipes—brief probably for the very good reason that he suffered no trouble from them. The question was of great interest to him; and he would have liked to have had the benefit of Mr. Ward's experience. So far as his own experience went, there were many controlling factors. Of course, they all knew the danger of overpulling; but, apart from this, the various classes of coals controlled very largely the number of stopped pipes. For his own part, he had found that unequal heating was a very important factor—perhaps the most important. He did not mean to say that level heating would prevent the trouble; but unequal heating would make matters much worse. He had seen ascension-pipes blocked with three different kinds of material, after less than 48 hours work. There was baked carbon, hard and slightly porous. Then there was pitchy tar. And alongside it was lamp-black. Yet, so far as he could determine, there had been no alteration in conditions during these 48 hours. He had seen pipes stopped as many as five times during a six-hour charge both with ordinary coal and cannel; so that a very tarry coal was not always the cure. He liked to see a wet mouthpiece; but his trouble was to obtain it. The author said, "If the ascension-pipes are short, coals should be eschewed which contain but little tar, and preference be given to tarry ones." He (the speaker) would imagine that very long ascension-pipes would be better for a tarry coal. With a short pipe, dusty coal would not be so bad. But whenever they could, it was best to have a tarry coal. Among other points in the paper, Mr. Ward said his exhauster often stopped, and the fact was not discovered for a long time. A make of 12,000 cubic feet per ton with the exhauster stopped was certainly rather a good result.

Mr. A. HANCOX (Great Malvern) said he would like to ask a question or two. First, the author referred to the primary and secondary air-slides and dampers, which he said were treated with more sacredness than they should be. Had he in his working known of a case of damage being done by these air-slides and dampers being handled by inexperienced men? What was the duration of the charges in his retorts, and did he shut down on Sundays? Then had he had any experience of retort-house governors, and what was the cause of his exhauster stopping so long and so often? Had he any pressure-recorder gauges, or did he rely on the water-gauge; and what means had he for the testing of his candle power?

Mr. T. BROOKE (Adderley Street) said Mr. Ward had told them that they could choose a coal which contained very little naphthalene. How did he find out how much naphthalene his coals did contain?

Mr. WARD: Did I not say "yield"?

Mr. BROOKE: Well, take yield. How do you find out how much naphthalene your coals yield, unless you are working over a long period with one coal alone? Continuing, he said that if Mr. Ward was changing his coals, he would probably find he was getting his stoppages from naphthalene a long time after the naphthalene had been formed; and it would, he thought, be difficult to ascertain to which particular coal it should be put down. There were, of course, methods for ascertaining this—such as Dr. Colman's—but they could not very well be applied to the small works to which he took it Mr. Ward's instructions or pieces of advice were intended to refer. The author told them to have large grate-areas to avoid clinkering. He quite agreed that a large grate-area was a thing they should have. Too many of the furnaces which were designed nowadays for a through bed had a grate-area very little bigger than it used to be for a single bed. The result was that the primary air had to go through at a great rate, and there was not proper contact. Clinker then formed which caused a lot of trouble. He had lately had experience of furnaces where the grate-area was in his opinion too small. He advised that it should be increased. There were some other alterations made at the same time, so that he could not say how much of what was saved was due to the changed grate-area; but he did know that now they did not get half the clinker in these fires that was formerly the case. While they used to go only 24 hours, with a pricking-up each three or four hours, they were now going easily for 48 hours, and in some cases a week, without clinkering. His brother had told him of a similar case a few miles north of London, where they had some settings put in, and could not get the heats up at all. The grate-area there was too small in comparison with the amount of coke that had to be consumed upon the fires; and now they were being made as large as they conveniently could be. Of course, they were always tied down by the size of the generator and arch; but if they were designing new settings, he should advise them to go as far back as possible. Mr. Ward, when speaking to him, mentioned 1 square foot of grate-area for every 10 feet of retort. This was somewhat similar to what he himself usually allowed—namely, not less than 1 square foot of area for every 8 lbs. of coke consumed per hour. Then the author said that he was not an extremist in the matter of light charges or heavy charges. He rightly pointed out that with a light charge there was a tendency for the hydrocarbons to get decomposed; and he advised a medium charge, which he said was two-thirds* of the retort. He (Mr. Brooke) had been running out roughly the contents of a retort. Taking a ⌂ section retort, 21 in. by 15 in.—which could not be said to be a large size, in fact it was much smaller than usual—this, if two-thirds full would hold a little over 11 cwt. of coal, which most of them would call an exceedingly heavy charge. As to tar-towers, in a small works he did not think they were a very great necessity; and as they were designed now, they were often a greater nuisance than the old method in a large works. The chief fault at present was to put too many beds on one tar-tower. If they were depending for their seal upon the weir-valve of the tar-tower, they must be certain that their hydraulic mains were kept level. In small works, it was the usual custom to put the hydraulic mains on standards directly on top of the brickwork, which meant that they were at different levels; and to prevent drawing-in air, it was necessary to seal the highest pipe, which sometimes meant several inches of seal on the lower ones. He was convinced that, if they were going to put in a tar-tower, it was advisable to have the weir-valves on each hydraulic as well. Then if the mains got out of level, they could work in the old way by closing the cocks to drain off the tar at the bottom of the mains, and using the weir-valve to each section to give the seal required. He had had experience of a case in which the tar-main leading into the tar-tower, instead of having a constant fall, had a rise from the end of the bench up to the tower. The tar gradually accumulated in this bend; and when the works were shut down for a day or two, it blocked up. They had to start lowering the tar-tower and steaming out.

Mr. R. S. RAMSDEN (Burton-on-Trent) asked what particular advantages Mr. Ward secured by removing the tar from the mouthpieces before drawing, and what he did with the tar thus taken off.

Mr. A. O. JONES (West Bromwich) asked whether direct-fired settings required a larger grate-area than regenerators. When next Mr. Ward tried an experiment with the dry main, he would suggest that he should use a 6-inch main, instead of the 2-inch pipe he mentioned. The retort-house governor, if placed in the right position, had come to stay. The author mentioned the use, instead, of a Pelouze extractor; but if he worked it out, he would find that this was a rather expensive alternative. An extractor for a 60 tons per day-works would cost about £100 to instal, as compared with £50 for a retort-house governor of the same capacity. The selection of the coal to be used was a very important matter. Some Staffordshire coal gave many stopped pipes unless mixed with Yorkshire coal, which had a thinner tar. The use of the auger was also important. He thought a good many of these were made much too heavy. One weighing about 6 lbs. was quite big enough. He did not find that anyone had answered Mr. Ward's final question; but, considering the coal he used, they might, to his (Mr. Jones's) mind, recommend him not to break the spell by alterations at present, but to continue "jogging along in his old-fashioned, humdrum style," with his 12,000 odd cubic feet of 16-candle gas.

Mr. T. H. POULSON (Stafford) thought that Mr. Ward was hardly fair in his remarks on retort-house governors. At Stafford, in 1905, the make was 10,632 cubic feet per ton of coal. This was before introducing the retort-house governors, and compared favourably with other works in the kingdom. Since that year, with retort-house governors, the make had varied from 11,100 to 11,800 cubic feet—thus showing a minimum increase of 500 cubic feet per ton. Stopped pipes were now practically *nil*, whereas before they were troublesome. With regard to bonuses to workmen, in the four years preceding the bonus system introduced at Stafford, the average cost of carbonizing per 1000 cubic feet was 2·88d.; whereas the average cost of four years' working on the bonus system was 1·77d. This, he believed, was among the lowest on record, more especially where machinery was not used; and he thought that if due regard were had for costs of repairing and renewing machinery as used for charging and discharging retorts, the cost of 1·77d. would compare very favourably with works where such machinery was installed.

Dr. W. B. DAVIDSON said he would like to modify the harshness of his remarks, made during the discussion on his own paper [see p. 767], about the quality and make of gas at the Knowle works. He thought, honestly, that to get 12,000 cubic feet per ton of gas that he could sell, without having complaints with regard to it, was very creditable indeed. He would like to know more of the details of the carbonization. Of course, they could increase the yield per ton by (say) 700 or 800 cubic feet—but he thought by means that were not legitimate. It was a question of nitrogen in the gas. It could be 2 per cent. or 10 per cent. If the latter, they got a low quality. But considering everything, he thought that Mr. Ward was doing famously to get so large a make and account for 11,500 cubic feet per ton. To find naphthalene deposits was no proof that coals yielded a larger amount of naphthalene. Personally (though he had not very good proofs), so far as he could judge, the amount of naphthalene made at a certain temperature of carbonization did not vary much; but the gas varied a great deal, and so did the tar made. The naphthalene rendered itself evident when there were insufficient heavy hydrocarbons to condense a lot of it and keep it in solution. When they had too small a quantity of these heavy hydrocarbons, the naphthalene became solid and gave trouble. It was not fair to say these coals had a larger yield of naphthalene. It was chiefly the nature of the gas.

Mr. WARD, in the course of a lengthy reply to the discussion, said he had thought they would probably call upon him to supplement his paper somewhat, as two months had elapsed since he

* This figure appeared as three-quarters in the paper as printed in the "JOURNAL" for Oct. 13, which had not been revised by the author.—ED. J.G.L.

read it. In this time he had to a certain extent increased his knowledge. To a certain extent he had modified his opinions, and to a certain extent he had taken up firmer ground. It was not necessary for him to repeat the advantages of cleanliness. If a man was clean, he would carry his work through in a clean manner. If he was told he had got to do his work in a cleanly manner, he would, for instance, see that there were no leaks at the mouthpieces. His works were in a residential district close to the main road; and he was very careful not to lose any gas through leaks in his retort-house. Since reading his paper, he had had two stopped pipes. He was working now a bed of five retorts, and making 9 million cubic feet a year. Until this year, he had not been able to make all the gas with the five retorts, but had had a little bed of two to assist. He had, however, been using very much heavier charges; and the two-thirds full which he mentioned in his paper would now have to be a bit modified, because he was filling his retorts as much as he could. The effect of using thicker charges was that he had no trouble at all with naphthalene, or practically none. He had been asked why the exhauster stopped, and the fact was not discovered for some time. He did not live on the works; and in winter he had only two stokers—one night and one day; and as they all went to dinner at the same time, between one and two o'clock there was no one on the works. For six months, he had only one stoker; and when the stoker left at six o'clock at night, he (Mr. Ward) often did not go to the works till nine or ten o'clock. The reason the exhauster stopped was naphthalene forming on it. This difficulty they overcame by simply pumping in tar-oil. As he had stated in his paper, the exhauster was driven by a gas-engine; and the governor was thrown out of action. As to the illuminating power, he was getting with ordinary charges 15 or 16 candles, tested by a jet photometer; but with the heavier charges his difficulty was not to keep up the illuminating power. It was the other way about. The gas at Knowle to-day was 18 or 19 candles; and he could not get it down. Of course, he had not a water-gas plant. Just before leaving the works, he tested the gas; and it was nearly 17¾ candles. He, however, intended to persevere, because he was making 7800 cubic feet per mouthpiece in his 21 in. by 15 in. by 8 ft. 6 in. retorts, and he hoped to get up to 8000 cubic feet, and to get through the winter with his bed of five retorts. Mr. Edmonds said the various classes of coals controlled very largely the number of stopped pipes; and on this point he adhered to what he stated in his paper. He had been a foreman for many years before taking up his present post. He knew therefore what it was to control gangs of men and to use different kinds of coal. Stopped pipes did not always arise from the action of heat. No doubt there were instances in which men would tamper with air-slides and dampers; but in his own case this difficulty did not arise, because he had only two men, and he was careful to train them properly himself. This was one reason why he got such good results. In small works cessation of gas-making did not fall on Sundays any more than on other days. That was, they made gas when they wanted it. He used the ordinary water-gauges; he had not any recording gauges. Mr. Brooke asked how he arrived at the quantity of naphthalene yielded by a coal. His experience of naphthalene was not very great—that was, so far as serious trouble was concerned. The only time that he had had trouble was when using a particular coal; and then it blocked the outlet of his gasholder twice on two successive days. As it happened to be near coal-buying time, he made up his mind to discard this particular coal; and he had since had no trouble, except in the exhauster, as already stated. The gas passed almost immediately to the condensers, and then he took it round the retort-house afterwards; and he thought he had increased his illuminating power, and also dealt largely with the naphthalene. The hydraulic main was supported by girders attached to the buckstaves. He had only recently sectionized the hydraulic main. He simply threw the tar or pitch from the mouthpieces back into the retorts, and made gas from it. Mr. Jones asked about the grate-area of direct fires and regenerators. He had not for some twenty years had anything to do with direct-fired retorts. He quite agreed that the 2-inch pipe to the hydraulic main mentioned in his paper was not large enough; but he did not think it was necessary to go to 6 inches. A 3-inch should be enough; but if he were doing the same thing again, he would probably put in a 4-inch pipe. As to the question of retort-house governors, one object in writing his paper was to draw the members out; but he had not heard anything which would warrant him in installing any of the plant to which he had taken exception. He had a better feeling towards retort-house governors than towards tar-towers, &c. When alluding to the Pelouze extractor, he referred to cases where there was already such an appliance installed. It was not necessary in such instances to put up retort-house governors, as the action was pretty much the same. If he were going to put down a Pelouze extractor, he should arrange to place it in front of the exhauster. He was very greatly indebted to the members for the manner in which they had received his contribution.

A bronze plaque to commemorate the services to Birmingham of Sir Richard and Mr. George Tangye, which has been placed in the entrance hall of the Art Gallery, was unveiled last Thursday by the Lord Mayor (Mr. G. H. Kenrick). The panel contains the portraits of the two brothers, and is the work of Professor Colton, A.R.A.

MEASURING, TESTING, AND RECORDING.

By Dr. W. B. Davidson, of Birmingham.

[A Paper read before the Midland Junior Gas Engineering Association, Dec. 12.]

Let me say at the outset how pleased I am to have the opportunity of contributing to the "Transactions" of the Association. I should naturally have preferred to publish the results of research work carried out on the large coal-testing plant placed under my charge at the Saltley Gas-Works; but, unfortunately, I am not yet in a position to make the experimental results public. As the subject I have chosen for my paper is one that requires careful consideration before submitting the results of coal tests to the engineering public, I hope you will bear with me while I attempt to deal with what may at first sight appear an uninteresting and unprofitable matter.

Reasonably Accurate Measurement Desirable.

I would be one of the last to advocate great refinement of testing or measuring where technical work is concerned, unless it can be proved to directly or indirectly increase the revenue of the industry in question. In every technical industry the financial aspect must be kept in the forefront. The signs of the times, however, forecast very keen competition and impress on us the necessity of supplying a manufactured article as uniform in quality as possible, and with the smallest margin in quantity consistent with what is deemed to be just. Again, the carbonization of coal is now rapidly approaching a degree of perfection. There is a definite limit to the volume of illuminating gas of standard quality obtainable from a ton of a given coal. Vertical retorts and high carbonizing temperatures have set up a standard which is not likely to be greatly surpassed; and though our systems of condensation and purification leave a great deal to be desired, and plenty of scope for improvement, we shall now have to be content with 2 or 3 per cent. increase in gas production where formerly 10 or 20 per cent. might reasonably have been expected. A limit to the yield of gas is set by the maximum temperature which the retorts and settings can withstand; and in some cases the safe limit has been nearly reached. A gain of even 2 or 3 per cent. is well worth striving for where the total output is large. It is not possible, however, to determine the advantages or the disadvantages of a new process or method without accurate measurement. Further, when valuing coals by means of practical working tests on a large scale, it is absolutely necessary to take all reasonable precautions to avoid the accumulation of errors if reliable results are to be obtained.

Not infrequently a little refinement in testing, while involving no additional labour or cost, adds considerably to the revenue. I have in mind an instance where an improvement in the testing apparatus, whereby more trustworthy analyses were obtained, and the introduction of the first and second decimal place in the atomic weights of the elements, resulted in an increase in sales of about £300 per annum for the material tested. To take another instance. It is not the usual practice in determining illuminating power to apply a correction to the height of the barometric column for temperature—that is, to reduce the mercury to 32° Fahr. and the brass scale to 62° Fahr. I suppose this has been considered an unnecessary refinement, only to be used by meteorologists. The correction is subtractive, and amounts on an average to 0·11 inch of mercury; and it increases the test of a 16-candle gas by 0·06 candle. This is a constant gain, and costs nothing in testing. It is equivalent to something like £1500 a year on an output of 7000 million cubic feet of gas.

I wish to draw your attention to a few outstanding inaccuracies occurring in the annual returns of a number of gas undertakings as published in "Field's Analysis," &c. It is necessary to point them out, as they are apt to be very misleading. I refer specially to the make of gas, unaccounted-for gas, make of coke, fuel consumption, and that *bête noir*, alike of the gas engineer and the gas chemist, the illuminating power. I will deal with these points in their order.

Make of Gas.

It is not creditable to the gas engineering profession that so little effort is made to correctly record and compare the registrations of the station meters, as in many cases no correction for barometric pressure, temperature, or meter pressure is applied. In this country, the normal temperature for gas made is taken as 60° Fahr. In the first edition of one of the best-known treatises on gas engineering, a method is prescribed for correcting the station meter records to this temperature. The method as given is inaccurate on three separate counts: (1) The co-efficient of expansion is stated as $\frac{1}{480}$, instead of $\frac{1}{492}$; (2), the co-efficient is applied to gas at 60° instead of gas at 32°; and (3), the assumption is tacitly made that the gas is dry, whereas it is saturated with moisture—that is to say, no correction is made for the aqueous vapour present, which varies from 0·8 per cent. at 40° to 4·7 per cent. at 90°. In a later edition, the first of these errors is corrected; the others remain.

If we consider the methods of correction applied by fourteen of the largest gas undertakings in England, we cannot but wonder at the lack of uniformity of practice, not to mention the possible inaccuracy. Four undertakings make no corrections whatever, four correct for temperature only (probably upon the dry basis),

three correct for temperature and barometric pressure, and three make the full correction for temperature, barometric pressure, and meter pressure. That the variations in temperature of the gas as measured at the works are considerable, is indicated below, where I give a list of the maximum, minimum, and average weekly temperatures at the station meters of nine different gas manufacturing plants for a year's working :—

	Weekly Maximum.	Weekly Minimum.	Yearly Average.
No. 1	88°	69°	78·4°
2	80°	65°	71·0°
3	73°	59°	64·5°
4	76°	44°	63·3°
5	68°	57°	62·2°
6	77°	47°	59·3°
7	67°	51°	58·2°
8	56°	51°	54·4°
9	71°	40°	56·2°

Thus, there is a maximum difference between maximum and minimum of 48° in the weekly averages, equivalent to 12 per cent. in gas volume. The average annual temperatures show a maximum difference of 24°, or about 6 per cent. in the volume of gas. The necessity of correcting for temperature must be obvious. The average weekly barometric pressure may vary as much as 6 per cent., though the annual average does not as a rule show any material fluctuation from year to year. The correction for barometric pressure is important to those who keep weekly records or make weekly comparisons. The average weekly pressure of the gas at the inlet to the station meter varies from about 4 inches to 10 inches column of water, a difference of 1½ per cent. in the make of gas per ton. Thus, in extreme cases, though the makes registered by meter may be identical, the true results may differ by as much as 18 per cent., as the following example shows :—

	Make as Registered. Cub. Ft. per Ton.	Average Temp. Deg.	Average Barom. Pressure. Inches Mercury.	Average Meter Pressure. Inches Water.	Make Corrected to 60°, 30 in. Mercury, *plus* 3 in. Water. Cub. Ft. per Ton.
1	10,000	40	30·70	10	10,920
2	10,000	84	28·90	4	9,020

In making careful comparisons between one works and another, or one week's working with another, it is imperative that all the foregoing corrections should be attended to if the records are to be of value. The additional trouble involved in doing so is trifling. The method we have adopted in Birmingham is to correct the volume recorded by the station meters to 60° Fahr. (moist gas), 29·70 inches of mercury (mean barometric pressure), *plus* 3 inches of water.

Unaccounted-for Gas.

This is obtained by subtracting the consumption as recorded by the consumers' meters from the gas sent out. As unaccounted-for gas is thus the difference between two nearly equal measurements, the relative or percentage error is liable to be very large. The variations in the returns of unaccounted-for gas from different undertakings are very striking; the lowest is about 2 per cent., and the highest about 16 per cent. A little consideration will convince us that many of the figures are quite worthless as they stand for purposes of comparison. The very fact that the gas made is not corrected for temperature in some cases involves a difference of 6 or more units in the percentage—that is, one works may show three or four times the percentage of unaccounted-for gas owing to a difference in temperature at the station meters, for which no allowance is made. The annual figures can be helpful to the gas undertaking concerned (not correcting for temperature) if the mean annual temperature of the gas passing through the station meter is not subject to variation.

It is, however, not altogether a simple matter to arrive at what can be called a fairly correct figure for the percentage of unaccounted-for gas. The difficulty lies in finding out the mean temperature of the gas consumed. This may be ascertained throughout any one year by taking a number of representative meters. I believe a close approximation to the truth will be made if, as is the practice of one large company, the temperature be taken to be 5° Fahr. lower than the mean atmospheric temperature in the shade. The latter is about 50° at Greenwich. It will not be necessary in this case to correct for barometric pressure, variations in which apply equally to the meters of consumers and the station meters. If the gas made at the works is already corrected to 60° and mean barometric pressure *plus* mean district pressure, it will only be necessary at the end of the year, or half year as the case may be, to correct the total to 45°, or some other accepted figure, and deduct the gas consumed.

Yield of Coke and Fuel for Retorts.

In "Field's Analysis," the average figure returned for the total coke made in three large gas undertakings in the Midlands is 12·4 cwt. per ton, or 62 per cent. This should, in all probability, be at least 67 per cent.; and as the figure for fuel to retorts (pounds of coke per 100 lbs. of coal carbonized) is obtained by subtracting the amount sold *plus* excess of stock, *plus* fuel to boilers, from the total quantity made and calculating the percentage on the total coal carbonized, the effect of taking the total yield at 62 instead of 67 is to reduce the fuel to the retorts by 5. In this way a ridiculously low fuel consumption is sometimes recorded. The quantity of coke made by different coals varies considerably. Evidently, therefore, if fuel to the retorts is to be returned at all, the proper way is to calculate the total coke made by each kind of coal carbonized, as determined by working tests.

Illuminating Power.

In estimating quantities, we are at liberty to apply our own methods of measurement; but the quality of the gas supplied to the district must in most cases be ascertained by methods and means prescribed by Act of Parliament, which effectually preclude the possibility of instituting general comparisons. I refrain from enumerating the different burners and methods used in testing the candle power of the gas. Photometry is a very vexatious business, as you are aware. The few gas companies permitted to use the No. 2 "Metropolitan" argand burner, or other similar burner, are to be envied; for they not only escape the bugbear of a test that is unfair to the gas, especially when it contains a proportion of carburetted water gas, but they obtain a much more reliable record of the quality of the gas as manufactured than is possible with the No. 1 argand burner, which severely penalizes a coal gas poor in heavy hydrocarbons, though in other respects of satisfactory composition, when burnt at the rate of 5 cubic feet per hour. The addition of a simple brass cone, threaded on a spindle and capable of vertical movement, by the adjustment of which the flame can be made of the desired height, gives higher and more uniform tests. But with this little addition, it would not be the exact Sugg's No. 1 "London" argand burner of forty years ago; and therefore it must not be used. Of course, there is nothing to hinder one from employing a modern burner in making tests for the sake of comparison; and I may say I have been keeping records of tests made with the No. 2 burner for some time past. When one looks at a list of the results obtained in testing one and the same sample of coal gas with different burners, one cannot fail to conclude that the mere statement of illuminating power in candles is not of much value unless the burner and the rate of consumption are specified.

I might be allowed to suggest that not only in the matters referred to are uniformity of practice and a greater degree of accuracy badly required, but also in dissections of costs of manufacture, such as carbonizing, coal and coke handling, and such like. It has been found useful in the electrical industry to confer and agree on the questions of standards and methods of testing and recording. There is no doubt united action in these matters would also be of great benefit to the gas industry.

Principles of Measurement.

In giving the result of a test, or in recording a measurement, it is only reasonable and right that the number should not only express the correct value, but should also signify by the number of figures employed the approximate degree of accuracy of which the operation in question is capable. This is the universal practice in modern physico-chemical work, and might with great advantage be observed in technical work, as it is only a question of attending to a few simple rules and exercising a little judgment. Let me give you illustrations of what I mean by want of judgment in measuring. (1) I set one of my assistants the task of measuring the capacity of some tar and liquor wells and tabulating the results for each inch of depth. He did so by the aid of a tape measure and highly mathematical formulæ (the wells being irregular in shape, with invert); and after a great deal of brain work he brought out a table giving the volumes with seven significant figures indicating an apparent accuracy of 0·005 gallon. He might have saved himself much needless labour had he considered the practical limitations to the reading of the dipping rod or to the determination of the height of the dividing plane between tar and liquor. He could have struck off the last three figures of each number in the table without suffering any real loss in accuracy. (2) In carrying out a titration, one finds the same type of analyst using (say) 2 c.c. of a solution where at least 20 c.c. could readily be employed. The former reading involves about ten times the accidental error of the latter, and renders the result less reliable. (3) The value of a coal for gas making is measured by what is termed the multiple, the product of quantity and quality—that is, make per ton and illuminating power in candles. The candle power is generally expressed to the second decimal place; the make per ton to the nearest cubic foot. Supposing the figures to be 16·32 and 11,243 respectively, the product is usually expressed as 183,486. There is no justification for writing down all these figures. The number would imply an accuracy of measurement of 1 in about 350,000, whereas in actual practice it certainly cannot be more than 1 in 350. It should accordingly be written 183,000, or simply 183; the factor 1000 being understood. Even if one accepts the values for gas and illuminating power as they stand, the product should be put down as 183,500, and not as 183,486. The multiplier 16·32 is stated to the nearest 0·01, or 1 in 1600; and therefore the product ought not to be carried beyond the fourth figure.

The mistake of using too many figures is a very common one, and is no doubt often due to want of familiarity with measuring instruments and their imperfections, and to want of training in scientific methods. Figures are too often treated without discrimination, with the result that statistics are sometimes regarded as the lowest type of falsehood. On the one hand, we must beware of gross inaccuracy; on the other, we must not strain at gnats and swallow camels. The use of too many figures is really a waste of labour in calculation, a waste of money in paper, writing, and printing, and an imposture (in a scientific sense) into the bargain.

Every instrument employed in measuring weight, volume, area, length, time, and temperature, is more or less inaccurate. In refined physico-chemical measurement, every graduated apparatus must be previously calibrated to prove that the errors are within the limit required, or else a set of corrections has to be obtained. Thus we can make the seemingly paradoxical statement that no thermometer, pyrometer, burette, or set of weights, however carefully made, can be considered correct and available for use for very accurate work unless corrections have to be applied. The mechanic who makes the apparatus has his limitations. We ought not to be the slaves of any instrument, however beautifully and wonderfully it is made. The only measurement that can be perfectly accurate is the counting of units which are indivisible. In accountancy we naturally expect everything to be absolutely correct.

Errors in Testing.

Assuming that all the conditions of testing are as correct as they can be made, that all the apparatus is in perfect order, and that the observer is properly trained, there still remain two classes of error: (1) The error of the instrument already referred to, or so-called constant error; (2), the error of observation—that is, the accidental or personal error.

The Error of the Instrument.—This depends on the kind of instrument, and largely on the maker. Some makers have no scruples in supplying instruments which to outward appearance are very fine but on testing are found to be totally unreliable. Indeed, it is not unusual to find high-priced works' thermometers, for example, with scales that are only graduated to every second degree, and with errors of four or five degrees. It is very necessary to check apparatus of this type. Some kinds of apparatus must be examined from time to time, as they are liable to deterioration through usage. It is further to be remarked that constant errors may arise through the neglect of small factors exercising an appreciable effect on the result. Where the error is constant, the accuracy of the result is not increased by repeating the test several times. It is otherwise with the error of observation.

The Error of Observation.—This error may be said to depend chiefly on the sensitiveness of the instrument, or, one might say, the openness of the scale. In certain tests, such as illuminating power tests, a peculiarity of eyesight may influence the result. I must say, however, I have not discovered much evidence of this.

Expression of Results.

In dealing with tests involving several measurements, the result should be expressed by a definite number of figures, so that all but the last are known with certainty. The last figure is correct to the nearest unit—that is, the error is not greater than $\pm$ 5 in the following place. This error is called the maximum apparent error of the number. Thus the scientific result 25·4 does not signify the same as 25·40; the maximum apparent error of the former being $\pm$ 0·05, or 1 in 500 (0·2 per cent.), in the latter $\pm$ 0·005, or 1 in 5000 (0·02 per cent.). The former measurement is a rough one; the latter a fine one. In rounding off figures, the rule to be observed is—if the figure in the place following the last to be retained is greater than, or equal to, 5, one unit should be added to the last figure retained.

Addition and subtraction of results affect the final result in such a way that the largest apparent error in any of the numbers is the maximum absolute error in the final number. Where multiplication or division of measurements is involved, we are concerned only with the relative or proportional (percentage) errors. When the error in one of the factors is comparatively very large, it may be taken as governing the accuracy of the final result. If the result is proportional to the "n^{th}" power of a measurement, the relative error of the latter is magnified "n" times.

The accidental error involved in a given determination can be estimated by making a series of tests and calculating the average deviation from the mean. Thus, to ascertain the error of observation in using the table photometer with a ten-candle standard, the following tests were made by six different observers: Candles, 16·79, 16·79, 16·64, 16·84, 16·70, 16·68. The mean of these readings is 16·74. The deviations from the mean, disregarding sign, are 0·05, 0·05, 0·10, 0·10, 0·04, 0·06; and the average deviation is 0·07. The error of observation is therefore about 1 in 250, or 0·4 per cent. In using the two-candle standard and a bar photometer, the same observers found 20·78, 20·46, 20·42, 20·22, 20·94, and 20·46 candles, in which series the average deviation is 0·21, or about 1 per cent. In this way, the superiority of the former method is demonstrated.

Sampling.

In testing large quantities of gas coals and their products of destructive distillation, one of the greatest difficulties is to obtain representative samples. Coal gas and carburetted water gas should either be tested frequently throughout the 24 hours by means of what are known to us as "spot" tests, or representative samples may be collected in holders of 200 or 300 cubic feet capacity night and day, and tested morning and evening. The most satisfactory arrangement would be to collect samples of seven hours' duration every shift (say) 11 p.m. to 6 a.m., 7 a.m. to 2 p.m., and 3 p.m. to 10 p.m.; the tests being made between 6 and 7 a.m., 2 and 3 p.m., and 10 and 11 p.m. Town gas is necessarily tested on the flow to the district. Coke is generally not tested systematically, except in connection with the testing of coals. It is necessary to sample the different sizes very carefully in order to get reliable tests for moisture. Samples of liquor or tar may be collected during the running-off of a tank. The sampling of tar presents difficulties when the percentage of water is large. Blowing in air at the bottom of the tank, where this can readily be done, is an effective way of mixing. In testing spent oxide of iron, care must be taken to make up the sample from many different parts of the heap, or from each barrow or cartload as the case may be.

Spot tests are of little or no value as a guide to the daily working. If made at sundry times, however, they furnish a reliable average for statistical purposes; and the average for the year may be very constant. Thus, the average illuminating power of town gas need not vary more than 0·01 candle from year to year.

Apparatus for Measuring Used on Gas-Works.

Weighing Machines.—Weighing is the most accurate of all measurements. The finest chemical balance can weigh to 1 part in 10,000,000. A good 20-ton steelyard weighing machine can weigh to the nearest pound—that is, with an accuracy of 1 in 100,000. Practically, weighing is generally performed to the nearest hundredweight. This signifies, on an ordinary truck of coal, an accuracy of 1 in 400, and on coke about 1 in 200, which is probably sufficient for all practical purposes. The seller generally allows a small margin in the weight. The more carefully he weighs, the less margin need he allow. Comparing the weights charged for with the actual weights of a large number of coal consignments, I find the average excess weight supplied was only 0·9 per cent., and no doubt a fair proportion of this came from the clouds. Half-an-inch of rainfall on an ordinary truck is about equivalent to 1 per cent. increase in weight.

Gas-Meters.—Station meters are tested to 1 in 1000—that is, to the nearest 0·1 per cent. The negative errors (slow readings) are those to be most feared, for they indicate leaks in the drum. The special test meter, which is very small compared with the station meter, tends to exaggerate the amount of leakage, which, of course, depends on the speed of the drum. The following is a list of actual tests made on the station meters at different works.

	Error, per Cent.		Error, per Cent.
No. 1	+ 0·4 (fast)	No. 11	− 2·2 (one chamber leaking)
2	+ 0·8	12	+ 0·2
3	+ 0·1	13	− 3·2 (put under repair)
4	− 3·2 (one chamber leaking)	14	− 0·4
5	+ 0·6	15	− 1·5
6	− 0·5	16	0·0
7	− 0·6	17	+ 0·5
8	0·0	18	+ 1·5
9	0·0	19	− 1·2
10	− 0·5	20	+ 0·2

The average error is − 0·45 per cent. (slow); but probably, for the reason given, this figure ought in reality to be much smaller. It is evidently unreasonable to express gas made per ton beyond 1 in 1000.

It is possible, by frequent checking, to maintain the accuracy of an experimental meter at less than $\pm$ 0·2 per cent. Alterations in capacity occur through water being deposited or removed by the gas, according to circumstances. It would be an advantage to the gas manufacturers if the meters of consumers were tested by a more accurate system than is at present in use. Moreover, it seems unfair that the seller should get no credit for increased specific gravity brought about by the cooling of the gas in the mains and services, or, failing that, should not be allowed to correct the tests to a temperature of 45° or whatever the average temperature of the gas consumed may be. The seller is at present deprived of at least 3 per cent.

Thermometers and Pyrometers.—Gas-works thermometers, at a reasonable price, can be obtained readable to the nearest 0·2° Fahr., and accurate to the nearest half-degree. Calorimeter thermometers should be accurate to the nearest 0·02° C. Pyrometers used in determining retort temperatures are comparatively inaccurate unless carefully standardized. I have known Siemens water pyrometers to have errors of over 50° Fahr., and the method of testing involves deviations of at least 20°. The Le Chatelier, Féry, and Wanner pyrometers are reliable instruments, which may be read to the nearest 5° Fahr., and are probably accurate to the nearest 10° Fahr. if standardized. Their initial cost is much greater than that of the water pyrometer; but that is soon saved in gas, time, and reliability.

Pressure and Draught Gauges.—Accuracy in reading gas pressures is not a desideratum, except in a few special cases. Glass tubes with white enamelled back and blue or black line, and graduated in tenths of an inch, may be used to give readings to the nearest 0·02 inch. Special appliances have to be employed for finer readings. The recording gauge is a great boon to the gas engineer.

Stop Clocks and Watches.—These require more frequent checking than might be expected. The Gas Referees prescribe that the time of consumption of $\frac{1}{6}$ cubic foot should be read to the nearest half-second. This reading involves a possible error of about 1 in 400, or 0·04 candle. A good stop-watch, however, can easily be read, and ought to be correct, to the nearest 0·2 second.

Where there are several sources of instrumental error, I find it advisable to have the instruments checked twice a week; the results of checking being entered on a printed form. Thus, in photometry, the form might be as shown on the following page. Serious errors of 3 or 4 per cent. may arise by allowing the meter

CORRECTIONS.

.....PHOTOMETER. .....WORKS.

Month of..... ..19....

Date.	Meter.	Leaks.	Clocks.	Distances.	Various.	Initials.

Record errors found in percentages + or − and readjust.
Empty pentane dregs, first Monday of month.

to become slow; and therefore this instrument requires frequent attention. A consideration of the reliability of other purely chemical tests, and, in particular, the debatable question of the accuracy of gas analysis as usually performed, with water as the confining liquid, would lead me too far at the present time.

Aids to Calculation.

Where there is a definite limit to the number of figures to be employed, abbreviated multiplication and division will be found to save a considerable amount of time. The slide-rule is only helpful where a low degree of accuracy is required; a 10-inch simple rule is correct only to 1 in 500. Four-figure logarithms may be used with advantage in many tests, particularly in photometry. The maximum error they involve is 1 in 4000. Elaborate and costly calculating machines for dealing with five or more figures are not so useful to the engineer or chemist as they are to the commercial man.

I should have liked to conclude my paper by indicating how weekly and monthly records of manufacturing results and tests of impurities may aid in the supervision and control of a number of works belonging to the same undertaking; but I feel that I have already encroached too much on your time.

Discussion.

Mr. A. O. Jones (West Bromwich) said he had to confess to some slight feeling of disappointment on first reading the paper. They all knew that Dr. Davidson was in a unique position to give the results of some very interesting experiments—things that would have been a great deal of use to them in their ordinary work. On reading the paper a second time, however, he realized that accuracy was of the utmost importance. The very keen competition with which they were faced at present, justified the exercise of the greatest possible care in making experiments, and getting the utmost out of their materials, and doing everything possible which was likely to increase their revenue and reduce the cost of the finished gas. In one part of the paper, the author mentioned the limit of the yield of gas as being set by the maximum temperature which the retorts and settings could withstand. The question was, Were they making the most use of the temperatures they had at present? Could they, by altering the methods of distillation, improve the makes they already obtained? Some years ago, when tar was perhaps cheaper than at present, experiments were made in the distillation of tar to form gas; and it was found to yield 15,000 cubic feet of 15-candle gas for every ton of tar distilled. Could they re-arrange their distillation so as to make use of this volume of additional gas, instead of selling the tar, as they did now, at less than 20s. per ton, when in the form of gas it would yield a much higher value? Speaking of the unaccounted-for gas and the large discrepancy in the percentages of loss, it had often been remarked that the unaccounted-for gas reckoned on the percentage of make was rather a bad way of doing it. It would be much better to express it as a loss of so many cubic feet per mile of main. In a small works a million cubic feet of gas lost was a much larger proportion on the make than in a bigger works, although the loss was the same. With regard to the method of estimating coke used for the retorts, they had recently at West Bromwich arranged to calculate their coke rather differently from what they had done in the past. They ascertained the actual weight of coal carbonized every week, and divided it by the coal charges, which gave the average rate per charge. The actual charges of coke used in the furnaces were then multiplied by a figure based on 66 per cent. of the weight of the coal charge. Dr. Davidson mentioned having kept records of tests with the No. 2 "Metropolitan" argand burner. It would be very interesting if he could give the members the results of these tests as compared with the No. 1 "London" argand. There seemed to be a discrepancy of about 2 candles, so far as he could see, between the results obtained with the two burners. With regard to the measurement of tar and liquor tanks by different systems, it appeared that the assistant had erred too much on the side of theory. Would it not have been quite as easy, and perhaps more accurate, to have filled up the tank from a vessel containing a known quantity of liquid, and then have measured the rise in the tank as compared with the gallons run in? The mention of recording gauges, reminded him that before they had retort-house governors at West Bromwich they had recording gauges; and he noticed one day that there was a lot of oscillation in the retort-house gauge, and on the following day a very good chart. On inquiring as to the reason of the improved result, the foreman pointed out to him that he had half-closed the tap on the recording gauge. After this he always took the precaution to have a water-gauge fixed at the side of the recording gauge, to see that the two were working to the same extent.

Mr. R. S. Ramsden (Burton-on-Trent), referring to Mr. Jones's opening remarks, said he thought they should take the paper as a sort of primer, to get them ready for the contribution in which Dr. Davidson would give them his results. With regard to the estimated gain of £1500 a year on an output of 7000 million cubic feet of gas by a refinement in photometry increasing the indicated illuminating power by 0·06 candle, would the author say what he found to be about the average cost of enrichment, and could he recommend any practicable means by which the unnecessary 0·06 candle power could be saved? On one or two occasions he had attempted to calculate the leakage from the blowholes at the top of a gasholder, by shutting the holder off for 24 or 48 hours and estimating the loss by counting the rivets. He, however, found it impossible to get anything like a satisfactory result, on account of the difference in temperature. Which would be the best place to take the temperature in a case of this kind?

Mr. F. J. Ward (Knowle) agreed with Dr. Davidson that care in everything was of the utmost importance, and also that corrections for temperature and barometric pressure should be made for comparative purposes. But from his point of view as a gas seller as well as a gas maker, it was the sale that affected him most. What amount could he get money for? When the output of gas was registered at a high temperature, and not corrected, the unaccounted-for figure would be heavy. He did nothing of the kind. Just as a matter of curiosity, he did hang a thermometer in the station-meter room; and he found the temperature had never been beyond 60°. As to Mr. Jones's remarks regarding leakage per mile of main, at Knowle they had just over 6 miles of main, and the unaccounted-for gas had never exceeded 4½ per cent., and had been down to 3¾ per cent. Last year was the highest; but he concluded that this was entirely because the previous summer was a very cold one, and the ground was naturally cold. He found his sales were always best when there had been a hot summer. The ground remained hot practically through the whole of the winter—it did not become cold until about March. In the quarter from December to March, he had on some occasions sold as much gas as he made. The author said that in measuring quantities they were at liberty to apply their own methods of measurement. He did not quite follow this, as he always understood there was a Sale of Gas Act. But he added that the quality of the gas must in most instances be ascertained by methods and means prescribed by Act of Parliament. In his (Mr. Ward's) own case, his Company was a non-statutory one; and they could, if they were foolish enough, supply gas of no illuminating power at all, or, on the other hand, they could make it as high as they chose. He was, however, careful to keep it at a reasonable standard. He was of opinion that gas should not be supplied at less than 16 candles tested by the No. 2 "Metropolitan" argand. In making gas, they must consider it was not possible to get below a certain quality, because flat flames were not done away with. If he got below 15 candles, he would very soon have the flat-flame people on to him.

The President (Mr. James Hewett) said that, in the first place, he must reciprocate the feeling expressed by Dr. Davidson at the beginning of his paper. They were most pleased that he had honoured their transactions with a contribution. The subject he had dealt with was a most important one; and his remarks would be of great value to them in the future. He had referred to what they might have had—results of research work on the large coal-testing plant at Saltley—and he (the President) would hasten to assure him that when he was at liberty to impart the information, the Association would be very grateful if it could appear as an original contribution to their "Transactions." In these days of statements of large losses in regard to present methods of manufacture, it was comforting to learn from scientists that they were within 2 or 3 per cent. of possible realization; but certainly even this small amount was worth striving for. Mr. Ramsden had already asked whether it was practicable to recover the £1500 a year which could be shown as a gain if a correction were made for temperature. He would like to inquire of Dr. Davidson if they did correct for the consumers to 45° Fahr., what effect the output of gas would have, considering how much larger it was in the winter than in the summer. Would not another correction be necessary to get near the correct figure, owing to the unequal outputs? As to the differences in the results of tests, why not employ those men who secured very much higher results than others? It appeared that men who got 16·79 candles were worth some thousands a year more than those who got 16·68 candles. Would it be possible to be trained so as to always get the higher figure. With regard to spot tests, he had always been of opinion that collecting gas in small holders was a great advantage, and gave much more reliable results. He was surprised to hear the author say that the average illuminating power of town gas need not vary more than 0·01 candle from year to year. He should have thought it would be more. It seemed very small; and the question was whether the expense of providing the apparatus, &c., was covered by such a small difference. The paper was quite a primer for them; and it was one to which they would often have to refer in the future. The matter was put forward very lucidly; and it was much to the point. They were indebted to Dr. Davidson; and he was sure they would accord him a hearty vote of thanks.

Mr. Jones seconded the vote, and hoped, as Mr. Ramsden had said, that the paper would prove merely the prelude to another which would go more into the practical side.

Dr. Davidson, after thanking the members for their reception

of his paper, remarked that naturally he had only touched the fringe of the subject, which was such a wide one that he had really had to curtail what he would have gladly said in the latter part of the paper. Mr. Jones had referred to the utility of the contribution. Certainly, it might not seem to be a very useful paper; but at the same time it appeared to him it was wanted, because he found there were very few men who appreciated figures. He thought they were wanting in chemical arithmetic, or had not had a training commensurate with the importance of the subject. This, of course, was not intended as a personal remark; but he was a teacher, and if he asked his students to give him the result of a problem he had great difficulty in getting it given correctly—usually it was too correct in the matter of decimal figures. Mr. Jones referred to the limit of yield of gas mentioned in the paper. He (Dr. Davidson) was, of course, alluding to ordinary destructive distillation of coal, and not distillation of tar. Of course, there were other means of increasing the make of gas from coal or coke by the aid of steam; but this was not destructive distillation. With regard to unaccounted-for gas, Mr. Jones seemed to think it would be better to reckon the figure in cubic feet per mile of main. This would be better in one sense—that it would give another kind of comparison. But unless the total of unaccounted-for gas was correct, there would be the same error in cubic feet per mile of main. He could not say that Mr. Jones's method of obtaining the fuel consumption for retorts was a very good one. As regarded the No. 2 "Metropolitan" argand burner, he agreed that the figures on the whole showed an advantage to the extent mentioned. He could not, however, give them the figures. Measurement of tar and liquor by the means Mr. Jones suggested, he thought, would be the best way. Mr. Ramsden wished to know how he arrived at the figure given of £1500 a year for 0·06 candle on 7000 million cubic feet of gas. He took the cost of enrichment by a candle as about 0·8d., which gave a round figure of £1500. They could quibble as much as they liked about the cost of enrichment. It was a matter of the price of benzol and the method adopted. Mr. Hewett could not understand that spot tests would give an average over a year varying not more than 0·01 candle. Did he not forget that there were so many tests—perhaps a thousand in a year—and it was very simple for the engineer who was keeping a note of the quality of the gas supplied to arrange matters so that his average for the year did not vary more than about 0·01 candle? If this was so, and they were calculating on giving a certain excess of quality—say, a candle, or whatever it was agreed to give—and they could work to give an average quality to the nearest 0·01, surely any saving in the candle power was worth a value. He took 0·06 candle to be worth somewhere about the figure he mentioned. He thought the President made a mistake when he said it would pay to have the man who got the highest test. He entirely forgot that this was an error of observation, and when the same man made the test six times he would get the deviations. It was, he mentioned, six observers; but the same man, if he conscientiously tested, would have the same differences. It was a mere accident. If the men were well trained, and they all agreed to adopt one method, the apparatus was very accurate; and he did not think there was much to be said on this score. A great deal depended on the training of the men and their method. Mr. Ward said that to sell gas was the main thing—and gas of a good quality. He quite agreed. But there was room for a great deal of difference as to what that quality should be. The Germans thought that 10 candle gas was sufficient; and those who saw the lighting of Berlin and other places were amply satisfied that there was no better lighting anywhere. Mr. Ward said he thought that 16 candles with the No. 2 "Metropolitan" argand was sufficient. He (Dr. Davidson) did not wonder that he got 12,000 cubic feet per ton. It should not be difficult to obtain this, if one only required 14 candles with the No. 1 "London" argand. The same gentleman spoke about 4½ per cent. of unaccounted-for gas; and he took credit for this to show that his gas was properly measured and everything was right. But here, again, one might deceive himself. How did he know that the figure of 4½ per cent. was correct? There might be errors of anything from 2 up to 16, if one did not know the temperature of the gas and pressure, and so on. It was simply begging the question to say, "My unaccounted-for gas is so much," when one did not measure it correctly. As regarded the question of applying the corrections to 45° for the gas sold in winter as compared with summer, the way this matter was managed in London in large gas-works was to correct daily. The daily mean temperature was ascertained; and the gas consumed was taken to be 5° lower than the mean daily temperature. The correction was made every day. It could also be done every half year, by determining what the mean temperature was.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

On Saturday afternoon the members of the Eastern Division of the Association paid a visit to the Burdiehouse Lime-Works, the property of the representatives of the late Sir David Baird, of Gilmerton. They were received by Mr. T. Webster, the Manager, and by him and his assistants were shown the process of lime burning. They afterwards walked down the incline into the pit, a depth of 300 fathoms, where they saw the materials being won. The seam is of fresh water lime, 20 feet in thickness. As the pit has been worked for hundreds of years, it has reached a great depth, and is a huge honeycomb of immense caverns, with roads everywhere—a most impressive spectacle.

On the party returning to the surface, Mr. H. Rule, of Falkirk, the Vice-President, offered an apology for absence from the President—Mr. A. Morton Fyffe, of Dundee—who, he said, had been detained by some of those little unforeseen matters with which they in the gas industry were all familiar. It had fallen to his (the speaker's) lot, therefore—and a very pleasant one it was—to ask the members to record their high appreciation of the kindness with which they had been received. He did not desire to enter into a controversy as to the advantages or disadvantages of lime for gas purification purposes; but there were many in the gas industry who continued to pin their faith to the use of this material. There was this much to be said in favour of lime, that complete purification could not be accomplished without its use. This visit would be another of the many pleasant ones the members had paid; and it had been highly instructive. The mine was one of the best of its class; and they had seen the care exercised in the preparation of the lime for the market.

Three hearty cheers having been given, Mr. Webster, in a few words, acknowledged the compliment, and the members dispersed.

THE LATE SIR GEORGE LIVESEY'S WILL.

The will of the late Sir George Livesey has now been proved; and the value of the estate is declared at £157,063 gross, with net personalty of £147,385. After providing certain amounts for the domestic servants in his employ at Reigate, the residue of the property is left to Lady Livesey for life; and on her decease £62,000 is to be paid to the children of his late brother Frank. Then an amount of stock the market value of which is over £20,000 is to be put in trust to form a fund to be vested in the Chairman, Secretary, Chief Engineer, the Workman-Director longest on the Board, and an Employee-Director to be elected by the staff, of the South Metropolitan and South Suburban Gas Companies, to first pay a few small annuities to servants, &c., and, subject thereto, to be applied for the benefit of the workmen of the Companies, "principally by way of relieving cases of distress amongst the Company's servants and their widows, in such a way as not to pauperize the recipients, or to interfere with their independence, and for the founding of a convalescent home for the benefit of the workmen and their dependents." Testator then goes on to state: "And as to the remainder of my property, as there is in my belief only one remedy for the ills of humanity, and that is that men should be raised in the fear and knowledge and love of God and of our Saviour, and subsidiary to this as a pledged teetotaler since the year 1850, I am convinced that to induce men, women, and children to abstain entirely from intoxicating drinks is one of the best means of helping them to better things, I, therefore, in such opinion leave the bulk of the property which God has given to me for such purposes as seem to me to be most beneficial and useful, and with that end in view" he gives the ultimate remainder of his property as was detailed last week, p. 679. Mr. Frank Bush is one of the Executors; and to him £1000 is given.

Hiring-Out Gas-Fires at Ilford.—With reference to the remark by Mr. P. E. Culling, as reported on p. 636 of the "JOURNAL" for last Tuesday week, that "as to hiring-out fires, he believed the Ilford Company and at least one other he knew of had given up the plan, as they found the hire-purchase system paid much better," he writes to point out that the actual position is that the Ilford Company are pushing the hire-purchase system in preference to the ordinary hire. As a matter of fact, he adds, the Company now offer their consumers a variety of six fires only on the hire system. It may be called to mind that when describing the Ilford Gas-Works in our issue for the 17th ult., we stated "the Company hire out gas-fires, or either sell them for cash or on the hire-purchase system; and consumers are taking considerable advantage of the latter easy method of acquiring their stoves—the purchase being arranged to cover a period of three years."

Relative Corrosion of Steel and Wrought-Iron Tubes.—Messrs. H. M. Howe and B. Stoughton, metallurgists, express in the "Engineering and Mining Journal" the opinion, based on tests made by themselves and others, of which they have the particulars, that good modern makes of steel tubes resist corrosion as well as, and in some cases even better than, those of wrought iron. An exception to this rule they found to be in the corrosive action of a mine water containing sulphuric acid, where the tests proved unfavourable, as might be expected, to even modern steel tubing. Tests were made by exposing steel and wrought-iron pipes side by side to the action of hot water, hot aërated salt water, to acid coal mine water, and to other waters, and by leaving them buried in damped ashes. The time of treatment varied from 7 to 26 months. They consider that the prejudice against steel in some quarters is based on insufficient evidence, or possibly upon tests carried out with steel of old makes and inferior quality.

Radiators.

The Case for the Steamless.

Accessibility and Maintenance.

THE Ideal Gas Apparatus, whether for Heating or Cooking, should be so constructed that it can be easily dismantled for purposes of maintenance, thereby considerably prolonging its durability and efficiency.

Hitherto the only known methods of securing uniform heat have been by the employment of Steam or Hot Water, but the Joints of such Apparatus have to be so constructed, to avoid leakage and withstand pressure, that the Apparatus can only be conveniently dismantled or reassembled at the Maker's Works.

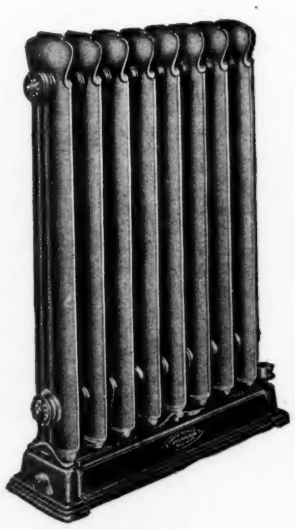
In the "DAVIS" STEAMLESS RADIATOR no water or steam is used, therefore no pressure is generated, and there is no possibility of leaky joints, while, at the same time, a uniform heat distribution is obtained.

This absence of water or steam has made it possible to construct the apparatus so that it can be dismantled and reassembled in a few minutes by simply undoing and refixing two screws and one nut.

It should be mentioned that the gas in the "DAVIS" STEAMLESS RADIATOR is consumed in an atmospheric burner in such a way that there is no flame contact, giving perfect combustion, and reducing to a minimum the necessity for cleaning.

Control.

DAVIS'S STEAMLESS RADIATOR is the only one that gives EVEN DISTRIBUTION OF HEAT and is, at the same time, UNDER PERFECT CONTROL. Each Radiator may be so regulated that a wide range of effective temperatures may be obtained. The necessary regulation is effected by the simple operation of turning a small screw, which, when adjusted, is locked by a simple and effective device.



Davis's Steamless Radiator.

DAVIS'S STEAMLESS RADIATOR has evoked expressions of unqualified approval from Gas Undertakings all over the country. If you have not already inspected a sample, we are anxious that you should do so without delay.

"DAVIS—
The Gas Stove People."

The Davis Gas Stove Co., Ltd.,

CAMBERWELL, LONDON, S.E.

The only complete Stoker.

REGISTERED
DISCHARGING CHARGER F.A. SIMULTANEOUS
TRADE MARK.

THE FIDDES-ALDRIDGE
SIMULTANEOUS DISCHARGING-CHARGER.
THE F. A. MACHINE.
The One and Only
Machine which Discharges and Charges at
One Stroke.

No Wear to Retorts. No Waste of Coal. No Cooling required.

Charges not thrown heavily into the Retorts.

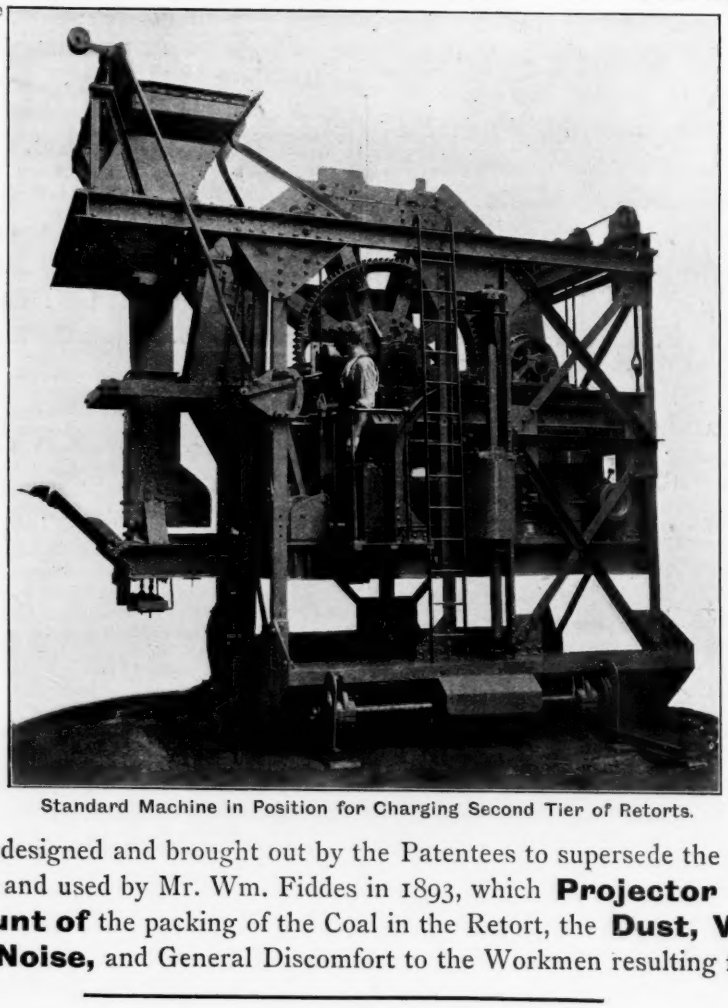
Highest Illuminating Power.

Highest Thermal Value.

Largest Yield per Ton.

Lowest Cost of Carbonizing Attainable.

Machine takes its supply of Coal Automatically from Overhead Hoppers as it Travels.



Standard Machine in Position for Charging Second Tier of Retorts.

Numerous Installations at Work both at Home and Abroad.

Operated either by Electric or Hydraulic Power.

Machine fitted with self-contained Hopper and Elevator, if desired.

This Machine was designed and brought out by the Patentees to supersede the Projector Charger, invented, patented, and used by Mr. Wm. Fiddes in 1893, which **Projector** was **discarded** by him **on account of** the packing of the Coal in the Retort, the **Dust, Waste, Flame, Smoke, Noise,** and General Discomfort to the Workmen resulting from its use.

Telegrams: "MOTORPATHY, LONDON."
Telephone: 5118 WESTMINSTER.

Works Department.
Telegrams: "SIMULTANE, BATH."
Telephone: 1036 BATH.

ALDRIDGE & RANKEN,
9, VICTORIA STREET,
LONDON, S.W.

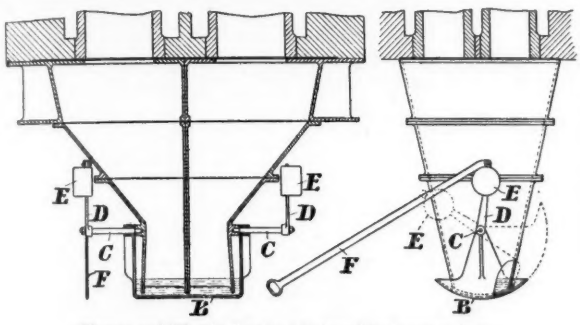
REGISTER OF PATENTS.

Vertical Retort Discharging Doors.

GLOVER, S., of St. Helens, and WEST, J., of Southport.

No. 25,521; Nov. 18, 1907.

These outlet doors of hoppers or receptacles which receive the coke discharged from vertical retorts are formed with a sealed water or liquid joint between an outlet door swinging from a centre joint and the hopper. The door, of segmental form, is suspended by trunnion pins about the centre of which it swings as heretofore when being opened or closed. The sides with the segmental shaped portion form a shallow dish to hold water. The lower ends of the coke-hopper project into the dish-shaped space of the door when the latter is closed, and the door is filled with water above the level of the edge of the hopper mouth. Consequently, the water seal prevents the exit of gas or the ingress of atmospheric air. When the door is opened, the water contained in it for forming the seal-joint is emptied along with the coke discharged, and when the door is returned to its closed position, a further quantity of water is supplied to form the water seal.



Glover and West's Vertical Retort Discharging Door.

The illustration shows a sectional elevation and end elevation of a coke-discharge hopper fixed below a battery of vertical retorts.

The outlet door B is suspended from trunnions C; and D are levers fixed to the trunnions, and having balance-weights E. To one of the levers is attached a connecting rod F, with handle at one end, or else a system of chains for operating the door may be employed. The door is kept filled with water, so that the lower edge of the hopper is covered, and a water seal prevents egress of gas or the ingress of air to the hopper.

Incandescent Gas-Mantles.

ROBIN, J. T., of Streatham, Surrey.

No. 25,657; Nov. 19, 1907.

This invention has for its chief object to enable mantles to be subjected to comparatively rough handling before use without appreciably affecting their strength or durability when in use.

It is well known, the patentee remarks, that if an ordinary incandescent gas-mantle is accidentally dented or creased, a fracture will be formed in the structure of the mantle, and thus cause it to break in a very short time after the mantle has been put to use; and attempts have been made to overcome this objection by applying various coating substances to the finished mantle—*i.e.*, after it has received its coating of collodion or other toughening medium. His proposal is to apply to the finished mantle a coating or layer of the nitrates of thorium and cerium, in or about the proportion in which they are used in the ordinary impregnating solution with which the fabric is treated in the early stages of the manufacture of the mantle—the solution being termed the "lighting fluid." This coating or layer, during the act of burning off the collodion or toughening medium, has the effect of mending or bridging the gaps that may exist in the structure of the mantle due to any denting or creasing.

He describes one method of carrying the invention into effect. He first prepares a 25 to 50 per cent. solution of thorium nitrate with a small percentage of cerium nitrate—thus obtaining a solution similar to the ordinary lighting fluid. He then takes the ordinary toughened or collodion coated mantles as placed upon the market and dips them in the solution of thorium and cerium nitrate above referred to. A thin film of the liquid adheres to the inner and outer surfaces of the mantles when they are withdrawn, so that on being dried they have a thin coating of the salts upon them, which will not only have the effect of mending any fractures that may have been formed by previous handling, but will also retard the combustion of the collodion or toughening medium; also "at the same time the nitrates of the coating in being transformed into the oxides during the burning off of the collodion give out a considerable amount of heat, which thus assists in the mending of the mantle."

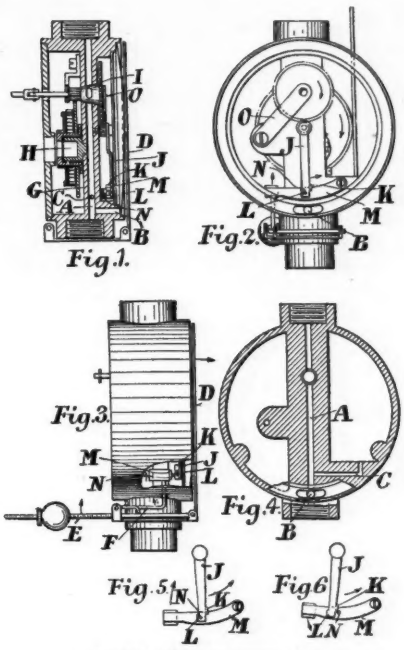
Igniting Gas at a Distance.

GERDES, A. F., of Berlin.

No. 28,437; Dec. 27, 1907.

This invention relates to apparatus for opening and closing gas-cocks—operating them by temporarily altering the normal pressure of the gas to a certain extent. The apparatus is inserted between the burner and the supply pipe, and contains substantially two chambers, one of which serves as a protection for the actuating mechanism, and the other as a "diaphragm chamber." In order that gas may not come into contact with the actuating mechanism, the diaphragm chamber is tightly shut off from the casing; and for all other gas currents—for example, those leading to the burner and to the igniting flame—particular passages are provided, which also keep the gas away from the actuating mechanism.

Fig. 1 is a longitudinal section; fig. 2, a back view (the flap diaphragm and partition being removed); fig. 3, a side elevation (with a portion of the side of the casing removed); and fig. 4, a section through the passages.



Gerdes' Distance Lamp Lighter.

The lower part of the casing supports the pipe through which (fig. 4 the gas enters the passages A B C. The passage A leads to the burner; B opens into a diaphragm chamber; while C runs to the igniting flames. On the inlet pipe the flap D is pivotally seated—for example, in a binge. Connected firmly with the flap is the lever arm E on which a weight can be adjusted as desired, to regulate the resistance which the flap presents to the diaphragm and to the gas pressure. The inlet pipe carries a second hinge, in which the lever F pivots, with a bent part running downwards and another running upwards. The bent part lies on the weight-lever E, and participates in its movement; so that the bent part also makes the same movements.

On the side G of the passage (fig. 1) a spring drum and wheel mechanism is seated, wound by a key inserted at H. By means of the wheel work the cock plug I is operated; and this in turn actuates a toothed wheel fixed on it, and engages with a pinion fixed to a locking arm J, on the free end of which is an upper lug K and a lower lug L. These lugs project laterally, and are adapted to come into contact with a pin N on a lever M, so that, after the lever moves upwards, the pin engages the upper lug, and after it moves downwards the lower lug. A pressing spring O acts as a counterbearing for the cock plug I. In consequence of the flap D swinging out in the direction indicated by the arrow (fig. 3), the weighted lever E is likewise moved in the direction of the arrow (in fact, upwards), raising the lever F that lies with its bent part on the lever in the direction of the arrow, so that the upper bent part presses up the free and weighted end of the lever M. In this way, the pin N is moved out of its position, as in fig. 3, in which it engages the lug L, into the position, as in fig. 6, in which it engages the lug K. As the locking arm J is constantly forced to the left (in the direction of the arrow), the arm is thrown round once, through the raising of the lever M, out of the position as in fig. 5 into that as in fig. 6. Thus, at first, the pin N is in the path of the lug L, and, after the turning, in the path of the lug K until, through the return movement of the flap D and the return movement of the lever F, the turning lever M falls into its original position, and thereby (after the locking arm has been further rotated to the extent of the distance between the lugs K L) the arrangement is again in the position as in fig. 5.

The movement out of the position shown in fig. 5 into that shown in fig. 6, and back again, results from the pressure of the gas increasing from the normal to an extent not attained in the ordinary variations of pressure. In consequence of the increase of pressure, the diaphragm, which has been inflated by the normal pressure of the gas, is further inflated, and thereby the flap is swung out sufficiently to cause the pin N to slide up on the lug L and release it. Consequently, the locking arm is rotated until its lug K strikes against the pin and the gas-cock is opened and the lamps ignited. If the pressure of the gas becomes normal again, the pin drops, so that the locking arm moves farther—to the extent of the distance between the lugs K and L—and the latter again lies against the pin.

Precisely as with the ignition, the extinction of the lamps is effected by repeating the operation—that is, by temporarily increasing the pressure of the gas.

Involuntary fluctuations of pressure cannot actuate the igniting device, because the lugs K and L are so long that, when there are moderate oscillations of the turning lever M, the pin N does not release the locking arm J. The release takes place when the pin, sliding along the lugs, has covered a distance corresponding to a certain increase or reduction in the gas pressure.

As is indicated in fig. 1, on to the shaft of the plug cock, which is extended for this purpose, a second or third shaft with plug-cocks can be

attached; so that all participate in the movement of the first. In this manner, the ignition or extinction of a number of lamps can be effected with one device. These mutually connected lamps can also be irregularly ignited or extinguished, if the plug-cocks for the other lamps are constructed in the manner of the multiple-way cock. In this manner, the evening and night lamps of the same lantern can be ignited simultaneously, but extinguished at different times.

Distillation of Tar.

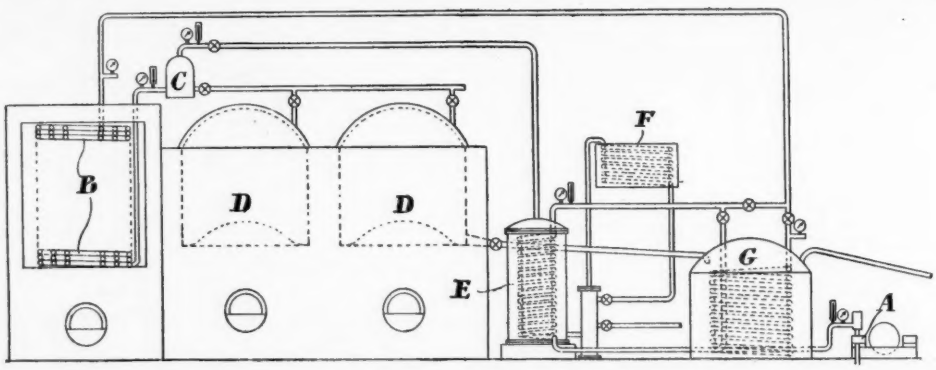
WILTON, T., of Beckton, and WILTON, G., of Mark Lane, E.C.

No. 26,910; Dec. 5, 1907.

This invention relates to the distillation of tar in pot-stills as distinguished from continuous stills; and concerning it the patentees remark: Owing to the high temperature at which coal is distilled at the present day, the resulting tar contains a large percentage of water, and is very difficult to deal with in a pot still in consequence of the excessive frothing caused by the water, and which "involves such delay in dealing with a given quantity of tar that a large number of stills have to be employed in order to avoid serious loss of time, so that the technical advantage attaching to the use of pot stills for distilling the tar is largely counteracted." The present invention avoids these drawbacks, and provides for liberating the water from the tar before the latter passes to the still.

The tar is first of all heated under such pressure as will prevent boiling and frothing of the contained water; and the pressure is then reduced or relieved in such manner as to liberate the water in the form of steam or vapour—this liberation being accomplished at such a temperature that the main volatile constituents of the tar are not liberated. The tar is thus led away to the still "free from water or practically so, and can be distilled with ease and dispatch." A small portion of the very light and volatile products (naphtha and ammonia) pass off with the water, when the pressure is relieved; but they can be recovered by condensing the steam.

In the method shown for carrying the invention into effect, the tar is forced under (say) 30 lbs. pressure by the aid of a pump A, through coils B, heated by a furnace to a temperature of rather above 130° C. The tar so heated is then released from pressure by being delivered in a comparatively small stream into a chamber or tank C, where, under



Wilton's Tar Distillation Plant.

the lessened pressure, the water is liberated in the form of vapour or steam, and passes away by the pipe shown, and the tar collects and flows away by the lower pipe to stills D of the usual type in which it is distilled without frothing.

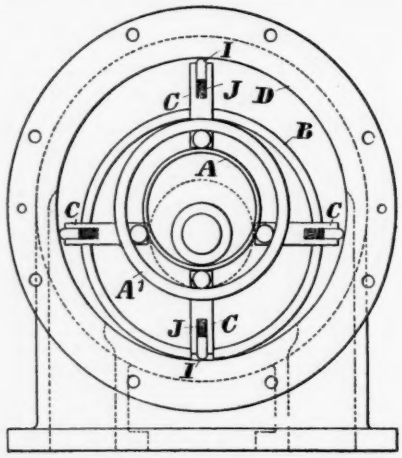
In order to recover the light oils liberated with the steam, and also to economize fuel, the vapours or steam may be led through a chamber E and utilized to heat up the tar as it passes from the pump through the coil G to the heater proper. After being so utilized, the vapours pass through a condenser F.

Rotary Gas and Air Compressors.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 2944; Feb. 10, 1908. No. 8121; April 13, 1908.

These applications for patents have been combined under section 16 of the 1907 Act. They relate to rotary gas and air compressors of the kind in which a rotating drum carrying blades works eccentrically in a fixed cylindrical casing; and the primary object aimed at is to provide an improved arrangement for holding in the blades against the action of centrifugal force. A further object is to provide suitable means for guiding the blades during the rotation of the drum.



Keith's Rotary Compressor.

The compressor comprises the following elements common to apparatus of this type: A slotted drum, B; blades, C; an outer cylindrical casing, D, and, if desired, rings A for holding out the blades, and bearing against pins or rollers or on sliding blocks fitted to the blades. These pins, rollers, or blocks, also serve an additional purpose.

The compressor is further provided with stiff balancing rings A', which work on the outer side of the pins, rollers, or blocks by means of which the centrifugal force applied to the opposite blades C is more or less balanced, and the ends of the blades are prevented from bearing on the inner face of the cylinder D. The extra distance is made up by sliding packing pieces I, which may be loose or fitted with springs J, to press them outwards.

A central circular web is provided on the drum B to tie the segments together; the slots in which the blades slide tending to open or close after machining. In this case, a recess is formed in the blades to stride over the web; and the slots are relieved below the web so as to permit of their being machined straight across.

Automatic Ignition and Extinction of Lamps.

FAGERLUND, E. A., of Stockholm.

No. 17,148; Aug. 14, 1908. Date claimed under International Convention, Aug. 16, 1907.

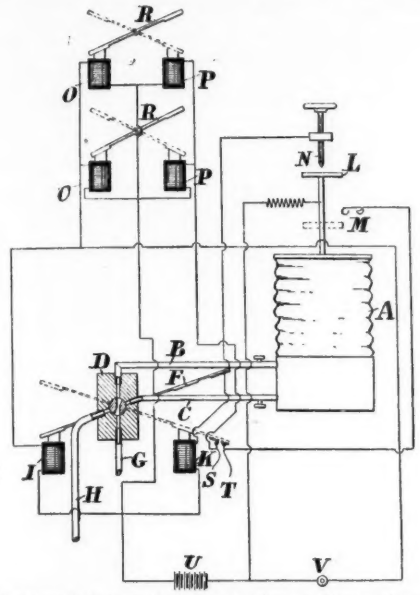
This invention consists in causing an electro-magnet placed in an electric circuit, at the closing of the current, to attract an armature connected with a gas-cock, so as to admit gas into a bellows or other body of suitable construction which expands upon the admission of gas and displaces a movable contact. This movable contact in one position of the bellows engages a fixed contact; the current being thereby closed through another electro-magnet which actuates the cock in a direction opposite to its first actuation. The cock is thus reversed, and the interior of the bellows is put in communication (say) with the open air, so that the gas therein may escape—the bellows device thus resuming its normal position. At the end of the movement of the bellows, the movable contact co-operates with a fixed contact, whereby a circuit provided with an electro-magnet in each lamp is closed. The electro-magnet thus actuates the cocks in such manner that the gas supply or the current to the lamps ceases, and the lamps are thereby extinguished.

A is a bellows or the like device, which, by means of two tubes B C, is combined with a two-way cock D, the plug of which is provided with an electro-magnet armature F. G indicates a gas-supply pipe, and H a gas-outlet pipe to the open air or with any gas-jet. I K are two electro-magnets, each located under one of the arms of the armature. The bellows is provided with a contact L, which is raised when the bellows is being filled with gas. M is a fixed contact, placed so as to co-operate with the contact L, when the latter is near its normal position. N is another contact—an adjustable screw against which the contact L presses when the bellows is expanded. O P are two electro-magnets corresponding to the electro-magnets I K, and arranged at each lamp to be ignited or extinguished. They actuate an armature R, which is combined with the plug of the gas-cock. The electro-magnet armature F connects, when occupying its normal position, the contacts S T with each other. U is a galvanic battery, and V a push contact.

The apparatus is connected-up in the following way: The battery U and the push contact V are placed in a main circuit, which, on the one hand, is connected with one pole of the electro-magnets I K and O P respectively, by means of branch circuits, and, on the other hand, by other branch circuits, is connected with the other pole of the electro-magnets O I respectively. The other pole of the electro-magnet P is connected with the contact S, and the other pole of the electro-magnet K with the contact N. From the main circuit a branch circuit is led to the movable contact L, and from the fixed contact M a circuit is led to the contact T.

The operation of the apparatus is as follows: Upon pressing the push contact V, the current is closed through the main circuit and certain of the branch circuits. The armatures F R will then occupy the positions shown by full lines, by which, firstly, the lamp at the

armatures R is lighted, and, secondly, the interior of the bellows is connected with the gas-supply pipe G by the pipe B. The bellows is then expanded; the contacts L M being connected with each other, without any reversal taking place, as the contacts S T are not connected. Finally the contact L will be connected with the contact N; the other circuits being closed. The armature F is then reversed



Fagerlund's Automatic Lamp Lighter and Extinguisher.

to the position indicated in dotted lines. Thereby, firstly, the contacts S T will be connected with each other, and, secondly, the interior of the bellows is brought into communication with the outlet pipe H. The bellows is then emptied so as to lower the contact L; this finally being connected with the contact M. The circuit armatures are thus reversed so as to extinguish the attached lamp. The apparatus has now resumed its normal position and can again be brought into action by pressure on the push contact V.

APPLICATIONS FOR LETTERS PATENT.

25,778.—Bailey, R., "Fluid-tight joints." Nov. 30.
25,781.—Dixon, W., and the Gas Power and Bye-Products Company, Ltd., "Gas-producers." Nov. 30.
25,906.—Wilson, H., "Bunsen burner fitting for household grates." Dec. 1.
25,917.—Davis, H. N., and Twigg, W. R., "Automatically regulating gas-heating apparatus." Dec. 1.
25,936.—Rossignol, A. E. le, "Generating power by the combustion of gases." Dec. 1.
25,979.—Fletcher, Russell, and Co., Ltd., Neil, A., and Fletcher, T. W., "Atmospheric gas-burners." Dec. 2.
25,982.—Parr, R. & P. E., "Anti-vibration devices." Dec. 2.
26,027.—Act.-Ges. für Kohlendestillation, "Recovering ammonia from gases produced in dry distillation." Dec. 2.
26,044.—Drabble, H., "Gas-heated toasting apparatus." Dec. 2.
26,056.—Aldridge, J. G. W., "Discharging-charger for gas-retorts." Dec. 2.
26,057.—Dobbie, J. C., "Valves." Dec. 2.
26,121.—Ely, B., and Rollason, A., "Treatment of coke." Dec. 3.
26,125.—Cross, W., and Son, Ltd., and Kirby, J. I., "Gas grillers or cookers." Dec. 3.
26,132.—Spreadbury, R. J., "Fender or trivet and vaporizing pan for gas-fires." Dec. 3.
26,146.—Lemoult, P., and La Société Anonyme des Etablissements Poulenc Frères, "Measuring the calorific power of gaseous combustibles." Dec. 3.
26,199.—Farnham, R. V., "Suction-gas producer." Dec. 4.
26,225.—Hudson, S. C., "Air-gas apparatus." Dec. 4.
26,267.—Croom, E. L., "Indicating the extinguishing of lights." Dec. 4.
26,296.—Lodigiani, D., "Obtaining strong aqueous solutions of creosote." Dec. 4.
26,326.—Cott, A. M., "Oil and gas tight joint." Dec. 5.
26,342.—Whiston, W., "Acetylene generators." Dec. 5.
26,387.—Garzòn, R., "Liquifying, pulverizing, and ejecting tar for the purpose of its utilization as a liquid fuel." Dec. 5.

Llandudno Water Supply.—At Llandudno, last Friday, Mr. F. O. Stanford held an inquiry into an application by the Llandudno Urban District Council for sanction to borrow £5226 for the purpose of extending their water-main from Llandudno Junction to the boundary of the urban district at Llanrhos, including the execution of works in several parishes. The Clerk to the Council (Mr. A. Conolly) said the total cost of the water scheme already carried out had been £28,632. When it was completed, it was believed that the town would be sufficiently supplied for some years to come. The new work had already been commenced with the object of providing work for the unemployed—a course which the Local Government Board had sanctioned. The amount already spent (£100) had been paid out of the suspense account. After the Deputy Engineer had given evidence, the inquiry closed, and the Inspector, accompanied by the officials, examined the works.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Livesey Memorial.

Sir,—I have read with interest the account of the meeting held last week—a meeting apparently attended by about 80 people, many of whom were members of the Society of British Gas Industries. This attendance represents probably 10 or 11 per cent. of the membership of the two societies. Surely such an important matter should not be hastily concluded and decided by so small a representation of those interested in the subject.

Doubtless, the proposed Leeds professorship will find many supporters; but the last word has not been said on the alternative suggestions, and I think the Council of the Institution of Gas Engineers are taking a grave responsibility, with only the authority of so few comparatively behind them.

The matter would not be very much prejudiced by delaying until June, when an afternoon sitting could be devoted to the subject, at which members of the Society of British Gas Industries could be invited. At such a meeting, proposers and seconders could be arranged for each object suggested, and the fullest discussion allowed—the feeling of the members being ascertained either by show of hands or else by ballot.

Personally, I am not particularly enamoured with the Leeds proposal, but am prepared to loyally support the views of the majority of a meeting held at a time when it is possible to get a representative attendance of those interested.

Bridgwater, Dec. 14, 1908. J. H. Cornish.

Lessening the Explosive Shock when Lighting Mantle Burners.

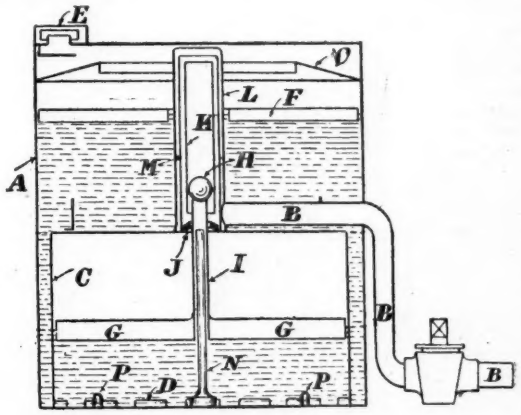
Sir,—In the course of his interesting paper to the Scottish Junior Gas Association, Mr. J. M'Ghee expressed a desire for the introduction of a sealing valve suitable for lessening the explosive shock, and consequent damage to the mantles, where a number of lights have to be switched on and off from a central point.

It may interest this gentleman, as well as those of your readers who have gone into the question of instantaneous lighting, to know that I have recently put on the market a device for this purpose originally constructed for my system for the instantaneous lighting of gas-lamps by means of spark-ignition.

The accompanying diagram hardly needs any explanation. On turning on the gas supply, the explosive mixture present in the pipes after a period of inactivity is rapidly carried to the air escape-trap fixed at the end of a series of lights, and finds a ready escape into the oil or water sealed bell. The time thus taken up is only a fraction of that required for the expulsion of the mixture through the burner-nozzles.

The apparatus can also be adapted to keep up a slight pressure in the pipes when the supply is cut off, in order to prevent the diffusion of air into the system.

Dyer's Buildings, E.C., Dec. 10, 1908. Herbert Tuchman.



Section of Air-Escape Trap.

A. Cylindrical vessel of 5 litres (8·8 pints) capacity, containing coal oil non-congealable and non-inflammable.
B. Connection with gas-main near the end of the gas-supply pipes.
C. Bell fixed to the bottom of A, with openings D permitting the oil to enter from A.
E. Opening in A communicating with the atmosphere.
F. Float to prevent the shaking of the oil.
G. Float supporting the vertical tube I on which the ball-valve H normally rests off its seat J.
K. Tube to guide the ball-valve H.
L and M. Concentric tubes making an annular passage for the gas to enter the bell C and forcing the gas to mount to the top of the case so as to prevent the possibility of the oil entering the pipes through B.
N. Guide for the float G.
O. Collar to oppose the throwing of the oil.
P. Stops for the floats F and G.

The Suggested New Standard Thread for Pipes.

Sir,—Will you permit me through your columns to call attention to a matter which appears to me to be of the deepest importance to the gas industry? A few days ago, I received a circular—in common, I presume, with all gas managers throughout the country—from

Messrs. Stewarts and Lloyds, to the effect that, after the 1st of July next, all tubes and fittings would be sent out (unless specially ordered otherwise) screwed according to a new standard thread, "authorized by the British Engineering Standards Committee."

Being impressed by the rather serious prospect this opened out, I made inquiries, and found that the Committee was composed of representatives of nearly every branch of engineering except gas, although gas engineers are by far the largest users of tubes.

Now, if this change of thread is carried out, it will be a very serious matter for all gas undertakings, large and small. All our mains are tapped to the present standard; and in case of renewals, the holes will require to be enlarged and re-screwed, or, where this is impracticable, cast-iron saddles will have to be resorted to. What will happen in the case of those who have Mannesmann tube mains, I do not know.

I have no idea what reason is assigned for the change. Of course, it may be said that we can always get the present standard if we ask for it. But people would forget to ask for it; and much confusion and trouble would be certain to ensue.

I think it would be well for gas engineers to take some united action in the matter, and by preference declare for the existing standard being continued.

Armagh, Dec. 9, 1908. JAS. WHIMSTER.

LEGAL INTELLIGENCE.

Tampering with Gas-Meters at Newport (Mon.).

At Newport (Mon.), on the 4th inst., Joseph Gooding and George Young were charged with being in void houses, Nos. 22 and 55, Lime Street, with intent to commit a felony; also with damaging a prepayment gas-meter in the latter house. The accused were seen leaving No. 22 by a police constable, who, suspecting them, took them into custody. At the station, Young tried to conceal some skeleton keys; and on Gooding were found a similar key that fitted the locks of six houses which had been previously robbed, a pair of pincers, and an implement which opened the locks on the Gas Company's meters. Evidence having been given as to the movements of the prisoners, and as to Young having kept watch while Gooding tried to pick the lock of a meter, Mr. H. E. Jones and Mr. L. H. Lane—the former the inspector and the latter the collector to the Company—deposed to finding that the lock on the meter in No. 55 had been strained, but that the money-box contained 3s. 9d. With regard to No. 22, the agent stated that he had not given permission to the prisoners to enter the house; and Mr. Lane said he found 5s. 8d. in the meter, but no damage had been done. Mr. Kinsey Morgan, who defended the accused, admitted that they went into No. 22, but not with the intention of committing a felony. He asked the Bench to deal leniently with the men, under the Probation of Offenders' Act. Gooding, who had been previously convicted, was fined 50s. or a month in each case—the sentences to run consecutively. Young was fined 25s., or ten days in each case.

Serious Charge against a Collector.

At the Westminster Police Court last Saturday, before Mr. Horace Smith, Herbert Henry Tomlinson, formerly a collector for the Willesden district of the Gaslight and Coke Company, surrendered to his bail to answer charges of embezzlement. The original charge on which he was arrested was one of falsification of accounts; but Mr. Robert Humphreys, who prosecuted for the Company, said the minor offence only would be proceeded with, so that it could be disposed of summarily. Defendant had been 26 years in the service of the Company, and his salary was £395 a year. Mr. H. T. Orford, one of the senior clerks of the Company, said that on the discovery of some irregularities defendant was seen. Voluntarily he said, "I am short in my cash, and all my trouble has been brought about by helping friends." He furnished a list of accounts he had withheld, amounting to £74, and within a few hours tendered the whole of the deficiency; but the Company would not accept it. Mr. Humphreys said the Directors of the Company could not be parties to an arrangement of any sort; but they were aware of the circumstances that justified him (Mr. Humphreys) in taking the unusual course of not pressing the charge. Dr. D. Y. Clarke, of Willesden, deposed that defendant had been suffering from nervous breakdown. Mr. James Furniss, J.P., and many other well-known residents of Willesden and the neighbourhood, testified to the high character defendant had borne for many years. It was stated that he had taken an active part in all local charity affairs. Mr. Pierron, solicitor, who appeared for the defendant, said he was a married man with a family. Upwards of £25,000 a year had passed through his hands. He had been foolish enough to borrow money lately, making his accounts straight at the end of the quarter. This folly had ruined him. He had forfeited character, a pension (nearly due) of £200 a year, and a sum of £400 which he had paid into a guarantee fund of the Company. Most earnestly, in this terribly sad case, he (Mr. Pierron) asked that the defendant might have a chance of retrieving his character. He had no intention of being dishonest; and the money deficient—£75—was ready there and then to be handed over, whatever the decision of the Court. His Worship thought it was a very sad case for a man long held in such esteem as the accused had been to sacrifice so much. He thought he was justified in accepting defendant's recognizance to come up for judgment if called upon. Mr. Pierron at once handed the £75 belonging to the Company to their representative. Mr. Humphreys accepted it, as he said it was the shareholders' money.

In a paragraph which appeared in the "JOURNAL" for the 24th ult., it was stated that an appeal was to be made from the sentence passed by the Lord Chief Justice upon Marcus E. S. Bernard, who was associated with Gyde and Darby in the Welsh Quarries frauds. The application was made to the Court of Criminal Appeal a few days ago; but their Lordships declined to interfere with the sentence.

MISCELLANEOUS NEWS.

CROYDON GAS COMPANY AND CO-PARTNERSHIP.

A largely attended meeting of the employees of the Croydon Gas Company was held in the Stove Repairing Shops at the Company's works at Waddon on Friday evening, for the purpose of hearing from the Directors an explanation of an important co-partnership scheme which they have adopted. Before the meeting, the employees were entertained to tea.

The chair was occupied by Mr. CHARLES HUSSEY, J.P., the Chairman of the Company, who was accompanied on the platform by Mr. T. Rigby (Deputy-Chairman), Mr. W. J. Russell, Mr. Corbet Woodall, Mr. W. Cash, and Mr. P. H. Hall (Directors), Mr. James W. Helps (General Manager), and Mr. W. W. Topley (Secretary).

The CHAIRMAN, addressing his hearers as "Fellow workers of the Croydon Gas Company," expressed the pleasure it gave the Directors to see such a large gathering, and said it augured well for the scheme, because their presence undoubtedly showed that they were taking some interest in it. It was not incumbent, he explained, on any workman or member of the staff to sign the agreement which was provided for in the scheme; but the Directors felt certain that the larger number, when they had thought out the matter, would feel that it was for the benefit of the employees, and that they would without hesitation join the scheme. He then read the following explanatory note, which had been prepared for circulation among the employees:

The Directors, believing that the interests of the Company and its employees can be promoted by the introduction of a system whereby the officials and workmen in its service may share in its prosperity, have resolved to set aside annually a sum of money for the payment of a bonus designed to constitute every employee a co-partner in the profits and a holder of a stake in the Company, and thus give to him an immediate personal interest in the general well-being of the business for which he works, and also a permanent interest in it as a stockholder.

By the Company's Acts of Parliament, the profits divisible among the holders of certain of the Company's stocks rise and fall as the price for gas to consumers falls and rises.

This is what is known as the sliding-scale, and the Directors now propose to apply the principle to the bonus which they will set aside for their employees who sign agreements of service and become co-partners under this scheme.

To arrange the scale it is necessary to take as a starting point some figure as a standard price. This starting point will be 3s. per 1000 cubic feet of gas; and the bonus will be ¾ per cent. (15s. on each £100) on the wages earned by an employee for every penny at which the Company is able to sell gas in Croydon at less than 3s. down to 2s. 8d., and 1 per cent. (20s. on each £100) for each penny below this.

The price of gas is now 2s. 8d.—that is, 4d. per 1000 less than 3s.; so that the annual bonus while this price lasts will be four times ¾ per cent.—that is, 3 per cent. (£3 on each £100) on the annual wages earned by each man.

Thus the benefit of a reduction in the price of gas, which has hitherto been confined to the consumers and the shareholders, will in future be shared by the employees. Every man will understand that by excellence in his own work, by care for the Company's property, and by generally doing everything in his power to further its interests, he is assisting to lower the price of gas by which as a co-partner he will benefit.

The first bonus will be declared on June 30, 1909, and will be for one year or such less time as any co-partner may have been in the Company's service.

To commence with, the co-partnership is offered freely to all who are regularly or permanently in the Company's service, subject to their entering into agreements of service. The renewal of these agreements and continuance in the co-partnership will depend upon the work and conduct of each employee.

The Directors desire to strongly impress upon the employees that the objects of the scheme are to encourage among them the spirit of thrift, and to make them realize that their interests and those of the Company are one. They would feel that it failed in its objects were any considerable number of the employees to regularly withdraw the withdrawable half of the bonus (see Rule 6), or sell the stock which they may acquire under the scheme; and they therefore reserve to themselves the right to put an end to the scheme if this should be the case. They are, however, confident from their knowledge of their employees, and from the experience of other companies who have adopted the system, that it will not fail, but will be both to Company and to men a lasting benefit and advantage.

Continuing, the Chairman said it was proposed that half the bonus should be placed with Trustees to the credit of the employees, and they could only withdraw, as a maximum, half the bonus that would come to them. The Directors hoped that many of them would not withdraw this, because the sooner they could make up enough to buy £5 of stock the better. This was the smallest amount of stock they could buy. The lowest price at which they could buy £5 of stock—though the amount, of course, was not a fixed one—was about £5 11s. to £5 12s. He expected that many of them would be making up this amount very quickly. A great deal of preliminary work had to be done; but they could begin paying in as soon as the agreement was signed. Anyone could put in as much as he liked, and could leave a shilling or two a week of his wages; and until the amount reached enough to buy £5 of stock, he would get 4 per cent. on it. They were not pioneers of the scheme. It had been adopted by fourteen companies. One scheme was about twenty years old, and another, close to them—the South Suburban Company—had been in existence for fourteen years. He added that 7138 employees of five gas companies had, by means of these schemes, acquired holdings which amounted in June to £437,713. The average holding of each man was rather over £61; and for the South Metropolitan Company—the pioneer—it was just on £70. To his mind, there was one weak point about the scheme—no provision was made for any benefit for the Directors. The Directors never contemplated that anything of the kind should be put in; but they were desirous that everyone else connected with the business should receive the full benefit of the scheme, and there could be no doubt that if they put their whole heart and soul into the business, and gave them their best services, the scheme would be a great success. In calling on Mr. Corbet Woodall

to follow him, the Chairman remarked that he was connected with three gas companies who had adopted the scheme; and the credit of bringing it under their notice belonged to him. When Mr. Woodall had explained it thoroughly to them, the Directors had no hesitation in adopting it for the benefit of the Croydon Company.

Mr. CORBET WOODALL was glad to meet so large a number of the workmen, and to know that if the scheme proposed were adopted such meetings would be of more frequent occurrence in future. The scheme did not provide any royal road to prosperity. He did not believe in royal roads. They must all work; and the advantage of such an arrangement was that the better they worked the greater would be their success. The scheme was not offered to the employees as an act of beneficence. The Directors had considered it as business men, and they believed that it would result in an advantage not simply to the employees, but to the Company itself and to all connected with it. They did claim that, having had a lead in a direction which they believed would be of advantage to all participants in it, they had not been slow to take advantage of it. This lead was given by one who was now taken away—Sir George Livesey—who saw how singularly appropriate co-partnership was to gas undertakings. They felt that to have this closer association of the employees with the shareholders would undoubtedly add to their prosperity by bringing about a higher standard of interest in the Company. There was no thought to put any strain on those employees who were working heartily and well, as a very large proportion—he hoped a large majority—of those who served the Company were doing; but they hoped there would be a levelling-up to the highest rather than a levelling-down to the poorer standard. If they were not content with anything short of the best, it went without saying that the prosperity of the Company would be enhanced and the benefit would be widespread. They had been asked why make this alteration in the conditions of service. He was happy to say that, so far as he was aware, the workmen of the Croydon Gas Company were a contented and happy family; but was that any reason why they (the Directors) should not try to do better? He said they had not done their best so long as they had not tried this plan, and they ought not to wait till there were signs of discontent. Although they did not know them at Croydon, such things as strikes and disagreement were not unknown. They did not want to wait until there was a feeling of this sort, but to do it at a time when everybody felt that the action of the Directors was such that they had no cause to complain. They did it because they thought it was right, not because there was any compulsion put upon them to do it. The scheme did not contemplate any radical change in the methods of the Company. There was a little error in the Chairman's remarks. He said he hoped they would put by the whole of the funds until they had enough to buy stock. He thought it was one of the rules that, until £5 had been put by, there must be no withdrawal of the bonus; so that the members should become shareholders as quickly as possible. At Tottenham, he was delighted to find that there were 400 additional shareholders in a fortnight. The Company had done their best in regard to pensions. The advantage the plan now proposed had over pensions was that a pension was very remote to the younger men; and under this scheme, when a man died he would have something to leave to those dependent on him. He believed that, if the scheme were adopted, it would be the means of adding to the happiness of many families. With all his heart he wished it success, and he commended it most cordially to their acceptance.

Mr. HELPS moved: "That we accept with gratitude the proposals made by the Directors, and pledge ourselves to do all in our power to further the objects of the co-partnership scheme." He was going to ask one of their oldest workmen, Mr. Quick, to second this. They would remember that nearly twenty years ago he called them together to have a talk with them, and told them that if they had any grievance, or if they had any benefit to ask, they were to go to him and he would take it to the Directors, who would, he felt sure, take it into consideration and remedy or grant it if possible. He now asked them if the promises then made had not been kept. The result was that the Directors had working for them one of the best bodies of men that it was possible for any company to have. The scheme was not proposed with the sole idea of insuring that they should do something for the Company. They knew very well that when they became shareholders in the Company they would require no pressing to do what was best for the concern. They had plenty of ways to help the Company to be even a greater success in the future than in the past. They had got 500 or 600 men working for the Company, and every one of them could be a canvasser for the Company. Whenever they heard anything said against the Company, or against gas, let them not stand it but try to put it right.

Mr. QUICK seconded the motion. He said he was one of the old workmen, and had watched the progress of the Company from the beginning. He felt it had been a pleasure to work for such a Company. They would be very foolish if they did not avail themselves of the opportunity that was given them by their worthy Directors. They would be helping one another; and he hoped they would all respond to it in the most hearty way.

The motion was then put and carried unanimously.

Mr. TOPLEY, in proposing a vote of thanks to the Directors, said they would not like to part without thanking the Directors for their hospitality and for all they had done for the employees in the step taken that night. What seemed to him to be the significance of the scheme was not that they were going to get a bonus at the end of the year, but that each of them was to be assisted to become a shareholder. He thought their interest in their work would be enhanced by this feeling, and that they would gain greatly by it.

Mr. PATEMAN seconded the vote; and it was carried unanimously.

Mr. CASH, in replying for the Directors, pointed out that the non-withdrawable portion of the bonus would be the men's property, and would remain their property, and that provision was made for a man to avail himself of it in times of stress. He emphasized the fact that it was not from any sense of dissatisfaction that the scheme had been brought forward, and said that the Directors believed they were well served by all the employees. They had always said on the Board that in Mr. Helps they had an excellent Engineer and chief officer.

The meeting concluded with cheers for the Directors.

DEVONPORT AUTOMATIC INSTALLATIONS.

Inquiry Committee's Powers Extended.

At the Meeting of the Devonport Town Council last Thursday, a long discussion took place on the report presented by the Special Committee appointed to inquire into the circumstances of Messrs. Willey and Co.'s contract for providing and fixing automatic gas installations in the borough. A summary of the report appeared in the last number of the "JOURNAL" (p. 709).

The MAYOR (Mr. J. P. Goldsmith), in moving the adoption of the report, said he had received a letter from Mr. A. B. Pilling, the late Town Clerk, which, as he wished to be fair all round, he would read. In the letter Mr. Pilling stated that he had seen a newspaper containing the report of the Special Committee, and he desired to say that if the newspaper account was a fair reproduction of the report, he strongly protested against its incomplete character, as far as he was concerned, and stating that he had not been treated with reasonable courtesy in the matter. He requested that his letter might be read to the Council when the report came before them. The Mayor said he did not know what Mr. Pilling meant by saying that he had not been treated with courtesy. As to the other remarks, he entirely denied them. Everything had been done in the most fair manner; and why Mr. Pilling should write the letter he could not understand, since no one had thrown stones at him. Some remarks might have been made in Committee; but there was nothing in the report.

The TOWN CLERK (Mr. R. J. Fittall) read the correspondence which had taken place between Mr. Pilling and himself. It began with a letter from Mr. Pilling on Oct. 2, in which he said he had been asked by a member of the Council for information on the subject of the contract, and stated that he should be pleased to give any he could. He asked to see the documents and correspondence on the subject. On Oct. 3 the documents were all sent to him; and Mr. Pilling wrote again. His letter was submitted to the Special Committee, who gave directions as to what parts of it were to be used for the purpose of their report. In acknowledging it, he told Mr. Pilling that he was not aware that his name had been, as he had said, "freely used in the matter." Mr. Pilling wrote on Dec. 3 again offering to render any assistance he could, and go to Devonport if his expenses were paid. In reply, he informed Mr. Pilling that the Committee were about to make an interim report, and promised to lay the letter before them at their next meeting. He left it to the Council to say whether in this there had been any discourtesy to Mr. Pilling.

Mr. TOZER, the Chairman of the Gas Committee, seconded the Mayor's motion for the adoption of the report. The matter was serious, both an account of the irregularity which had taken place in bringing about the contract, and on account of the financial loss which would have to be borne by the undertaking during the next five years. Three points stood out prominently in going through the correspondence and the minutes. The first was that there was nothing which pointed to any competition in arranging the contract with Messrs. Willey and Co. They were the only firm dealt with. To enter into a contract involving an expenditure of £50,000, without competition, was a very irregular thing. The second point was that the contract was entered into against the advice of the then Engineer. Most serious of all was that the contract had been drawn up and settled without going before either the Gas Committee or the Council. It had been clearly shown that the contract was entered at prices which in 1903 were 15 per cent. higher than it could have been done for, and that the Committee could carry on the maintenance for the next five years at 21¾ per cent. less than they would pay under the contract.

Alderman WAYCOTT proposed that they should defer the discussion until the Committee had presented a complete report, and said he thought this would be in the interest of all concerned.

The proposition, however, was not agreed to.

Mr. TOZER, resuming, said the ex-Chairman of the Gas Committee had stated, on more than one occasion, that he did not know anything about the agreement. It was clear, however, that before the agreement came about there was a considerable amount of correspondence, a number of interviews with Messrs. Willey and Co., and there were letters from the firm to the Chairman. These negotiations began as early as October, 1902, and on July 3, 1903, copies of the agreement were sent by the Town Clerk to the Engineer, to Messrs. Willey and Co., and to the Chairman of the Committee. Therefore he thought the Chairman really must have known of this very important agreement, which took six or eight months to bring about. Perhaps Alderman Hornbrook did not mean it, but he certainly misled the Council and the ratepayers when he spoke there of the accounts of the gas undertaking for 1907, and, referring to the amount of the gross profit—the net profit was only £748—said he was not going to call the statement a report but a proclamation. He told them then that Devonport had in the gas-works the richest prize it would ever possess. Was that the fact, and would it be true if the agreement stood for the next five years? This was not a matter on which they could afford to take sides. One and all should be actuated by the desire to get the contract amended so that the gas undertaking might not be saddled with this incubus of nearly £2000 a year. The Special Committee recommended the Council to give them further powers to enter into such negotiations with Messrs. Willey and Co. as they might be advised. He should like their powers to be so enlarged that they could inquire into the whole thing relating to the gas undertaking, because he was convinced that going deeper and further than related to this particular contract would be greatly to the interest of the town.

Mr. BISHOP contended that the Special Committee had not made a report, but had only presented a record of their proceedings. [Alderman HORNBROOK: And that only in part.] It made no recommendations, and contained a record of only half the witnesses examined. The point brought out was that no one seemed to know how the contract came into existence or anything about it, except that it bore the seal of the Corporation and the signature of the Mayor at that time (Mr. Tozer). There were several members of the Gas Committee at that time who were now among the critics of the agreement. Why did

they not consider the draft agreement? At the meeting of the Committee a few days previously, letters were produced which stunned him. He at once went to Exeter and saw the Directors of Messrs. Willey and Co., and all the correspondence. They promised that the whole of it should be sent to the Town Clerk; but this was before there was any talk of legal proceedings. The correspondence showed that the contracts were not extended by the Chairman of the Committee.

The TOWN CLERK remarked that Mr. Bishop was now referring to a matter which was not dealt with in the report before the Council.

Mr. BISHOP said the Special Committee had been inquiring into matters extending over the past five years; and he would suggest that they should have power to go into the whole business of the gas undertaking from its purchase by the Corporation. They would then be able to apportion the blame for the erection of that monument of folly, the new gasholder. In his opinion, the only man culpable was the one who signed the contract, and who should not have signed without knowing something about it. As to the terms of the contract, they were exactly the same as were entered into by the Plymouth Gas Company—one of the cutest gas companies; and if it was damnable for Devonport, it was awful for Plymouth.

Mr. BARTLETT moved that the matter be referred back to the Gas Committee. He had been told that the Town Clerk advised that the agreement could not be broken.

The TOWN CLERK: I have given no such advice.

Mr. BARTLETT said he was very glad to hear that. He could quite understand the Contractors asking for payment, as maintenance, of 5 per cent. on the cost of installations which had been in use for five years; but he could not conceive how any Committee agreed to pay 5 per cent. on the cost of installations which had been put in only a week or two. He thought, however, that the Council were very badly advised when they appointed the Special Committee. Instead of allowing the Gas Committee to proceed quietly and by conference, the Special Committee had put the Contractors' backs against the wall, and they had consulted Solicitors. Why not let the Gas Committee go on with their own work? Were the present Gas Committee responsible for the action of the Committee of six years ago, or even for the signature of the Mayor of five years ago? They had a very clever and able business man in the chair now; and the best thing they could do was to leave it to the Committee to get the Council out of the muddle they were in.

Mr. Bartlett's amendment was seconded and at once put to the vote, but obtained only three supporters.

The MAYOR, referring to the criticism of Mr. Tozer's action in signing the agreement without ascertaining its character, said that if the Town Clerk asked him to sign documents, he should do so without asking to see the authority. They trusted the Town Clerk, and it was not fair to blame Mr. Tozer for merely signing the document.

Alderman WAYCOTT said his experience when in the chair for two years was that the Mayor signed the documents presented by the Town Clerk as a matter of course.

Mr. MARTYN moved that the Special Committee have full power to inquire into any contracts affecting the gas undertaking. He thought members of the Council ought to be very discreet and not go and interview people with whom they were in a delicate position.

Mr. FREDMAN believed that everyone in the Council and in the town would like the Committee to be given further powers. It was not fair that only half the tale should be told. Complaint had been made that the Mayor at that time did not remember having signed this agreement; but, on the other hand, they had the Chairman of the Committee, who, in spite of these prolonged negotiations, did not remember the draft agreement being sent to him. As a Committee, they had some ground of complaint that in a matter of this importance, in which various interviews took place and there was voluminous correspondence, the Chairman said "I know nothing of this clause being deleted"—a very important clause which was favourable to the Corporation, and gave them power to determine the agreement on giving notice. The Committee had spent a good deal of time upon this matter; and it was in the general interest that they have absolute power to go into the whole of it.

The amendment was carried.

Mr. ELLIS said he believed it was perfectly true that the Plymouth Gas Company entered into a contract with Messrs. Willey and Co. similar to that made by the Corporation; but the Gas Company kept the power to terminate the contract. The agreement would have been perfectly satisfactory to Devonport if they had been able to cancel it this year. The Plymouth Gas Company had the power, and as astute business men they exercised it.

Mr. DAYMOND called attention to a clause in the report which stated that applications for new automatic installations were to be held over for the present, and suggested that some temporary arrangement should be made so as to meet the convenience of people requiring slot-meter supplies.

Alderman WAYCOTT said the information placed before the Committee by the Engineer led them to the conclusion that it was not in the interest of the undertaking financially to put in any further installations for the time being.

Alderman LITTLETON thought the Committee had no alternative in the matter. As he understood it, the slot-meter consumers paid 3s. 6d. per 1000 cubic feet of gas consumed, on which there was a profit of 4d.; but if they had to pay this charge of 4s. 8d. for maintenance, the profit would be converted into a loss.

Alderman P. C. GOODMAN expressed the opinion that the best possible plan would be to stop the whole of these installations. He was glad the Committee had full powers of investigation; and he hoped they would carry them out.

Alderman HORNBROOK said it seemed to him the Council had been doing everything but the right thing. They had not confined themselves to the report. What had they heard of the report? Nothing. To his mind one of the ugliest things that had arisen since the inquiry started was "How could it possibly occur that Mr. Pilling endorsed that deed with the remark 'By order of the Special Committee,' or words to that effect." This came to him as a big surprise, because he could recollect nothing of it; and several with whom he had spoken on the matter were in a similar position. That cloud had been lifted by the report, and nobody had spoken a word about it. Mr. Stevenson, the Gas Engineer at the time, told them that the Committee were called together, and that Mr. Willey was present, and persuaded them to alter it, which was done. Therein lay the whole mischief. If the clause had remained, there would not have been a word to be said. It would be quite pardonable if he had forgotten that meeting, but there was occasion to remember it; and here was the Engineer who was present at the meeting, and told them so himself. Why, as minute clerk, did not the Engineer put it on the minutes? If he had, the whole thing would have been explained, and they would have wanted nothing more. But then, the Committee having disposed of it, the matter went on to the Town Clerk. Who could have told the Town Clerk what happened at the meeting, he not having been present? Did the Engineer not tell him? Mr. Pilling ought to be asked that question. The contract was going forward and backward for a very long time. The Committee at last passed it on to the Town Clerk and the Engineer, with the instruction, "This is your business. You will deal with it." What was the experience of the Council in hundreds of cases where legal business was concerned? Was it not that when once it passed the border of the Committee it went on through its legal process, and they knew nothing more about it until the Town Clerk said the thing was finished? He had faith in Mr. Pilling, and so had the Council. The Town Clerk said they had done the best they could and had made a good contract. He (Mr. Hornbrook) declared on his honour that the Engineer said to him, in answer to a question as to whether he thought they had made a good job of it: "You have made a very good contract. There is no other firm that would have done it for the money. If another five years had been added, it would have been a very good thing." When the Committee met, it was only fair that, if his name were mentioned, he should be there to answer what was said about him. It must have been a very long time that the Committee talked about, or allowed others to say, what was utterly untrue about him; and not a single word was heard or published about it. He was quite prepared to leave things to the ratepayers of Devonport. Letters were put in that contracts were extended by the Chairman. He never extended a contract for five minutes. It was true he said to the Engineer that iron had gone up 40 per cent., and these people were tendering 40, 50, 60, 70, and 75 per cent. cheaper than anybody else. The suggestion was made that the firm should be asked to extend the contract for two years, and they replied that they understood it to be for three years; and they would abide by it. The words in the minutes were, "The Chairman's action was approved."

The TOWN CLERK, replying to Mr. Hornbrook, said this matter did not come before the Special Committee. It was perfectly regularly done on the minutes subsequently.

The MAYOR remarked that he attended every meeting of the Special Committee except the last, when Mr. Hornbrook was present. Mr. Hornbrook's name was not mentioned. The Committee were simply trying to ascertain the facts. They were not attacking Mr. Hornbrook or anybody else.

Alderman HORNBROOK said the first he heard about the contract being a bad one was a fortnight before the foundation-stone of the new retort-house was laid. They went to Exeter and submitted three propositions to Messrs. Willey and Co. The whole idea was that they should proceed by careful negotiations, and not rush on to them with legal threats or breaking of contracts. When they went to Exeter, they saw one man, who promised to bring the matter before the debenture and share holders. He said: "Who knows what our bill will be after it is sent in, and whether a bill will be sent in at all?" He (the speaker) thought those were encouraging words; and if the Council ever made a mistake, it was in taking the matter out of the hands of the Committee, who were carefully handling it, and would have brought it to an issue. The Council had plunged into litigation. The firm made them a promise; but the Council had not the patience to wait.

Mr. STROUD asked if Alderman Hornbrook made the same statements about Mr. Buckley at the meeting of the Committee as he had now made; and if so, why they were not in the report, which they were told was a verbatim one.

Alderman HORNBROOK said he stood by the report, and he did not know that he had made any variation from what he said before the Committee.

Mr. BRENTON protested against aspersions being cast upon the late Engineer.

Mr. BIRCH said that from the discussion it did not appear that any responsibility rested upon the late Town Clerk for the striking out of the termination clause of the agreement.

Alderman LITTLETON said that, although they had learned a great deal from the debate, the main issue was still at stake. Mr. Buckley, the late Gas Engineer, thought he saw in January last an opportunity of saving the ratepayers £1500 or £2000 a year by determining the contract; but when he came to examine it, he found that the determining clause did not exist. Then when he asked the Chairman if he should introduce the question, the Chairman said it had nothing to do with him at all.

Alderman HORNBROOK: That is not true. I deny that.

Alderman LITTLETON said the Engineer made the statement; and he also said in March and July he made a statement to the same effect and that not one of the Committee or Sub-Committee really knew what the terms of the agreement were. Mr. Stevenson said he never agreed to the contract being made; that he put in a clause which would have protected the ratepayers and the Gas Committee; and that he never agreed to withdraw it.

Alderman HORNBROOK said they had better get the late Town Clerk down and get his version of it. After it was known they were going to lose £1500 a year, it was the duty of Mr. Buckley to tell the Committee and the Committee the Council. This was the position he took. He blamed nobody at present. He trusted that what they had heard that morning they might be able to piece together and get nearer to the culprit who deliberately struck out the clause.

The resolution as amended was then put and agreed to unanimously.

The Directors of the Welsbach Incandescent Gaslight Company, Limited, have declared an interim dividend on the preference shares at the rate of 6 per cent. per annum for the half year ended Sept. 30.

CONTINENTAL UNION GAS COMPANY, LIMITED.

The Ordinary General Meeting of the Company was held last Tuesday, at the London Offices, No. 7, Drapers' Gardens, Throgmorton Street, E.C.—Mr. ARTHUR LUCAS in the chair.

The SECRETARY (Mr. W. Martin) read the notice convening the meeting; and the Directors' report—extracts from which appeared in the "JOURNAL" for the 24th ult., p. 573—and the accounts were taken as read.

TRANSFER OF THE MONTARGIS STATION TO THE UNION DES GAZ.

The CHAIRMAN, in moving the adoption of the report and accounts, said the proprietors would note that reference was made in the former, in the second paragraph, to the transfer of the Montargis station to the Union des Gaz. When they met last year, he explained why the Directors were induced to make this transfer; and he stated that the negotiations, when completed, would not be to the disadvantage of the Company. He was now able to inform the proprietors that the transfer of the station to the French Company (which transfer by the way had been approved by the Municipal Authorities of Montargis) had been effected under satisfactory conditions; that the amount received from the Union des Gaz had been invested in the shares of that Company; and that the Continental Union Company would receive about the same interest as they had been earning under previous conditions.

THE POSITION AT MESSINA.

At Messina, as stated in the report, there had been an increase of about 6 per cent. both in the number of consumers and the amount of gas sold; but the increase in the profits had been partly neutralized by the higher amount they had had to pay for coal and labour. It would be noted that in the balance-sheet the Messina town arrears now amounted to the large sum of £35,987. The proprietors might remember that he informed them last year that the Municipality of the city were about to raise a loan to pay off the debt, which then amounted to £34,411, and that he hoped the whole sum would be repaid in April. The Italian Government authorized the Municipality to raise only half the amount required; and this half was devoted to the payment for a new water supply. Consequently, the Directors—seeing no hope of a speedy settlement—were compelled to take legal proceedings against the town, which they were assured would eventually pay the debt that it had admitted was a just one.

THE GENERAL FINANCIAL POSITION.

He would ask the proprietors to look at the general revenue account; and they would see £2629 under the head of "Management and General Charges, &c." Now this amount was £906 less than in 1907, and the charges for taxes, exchange, and amortization were £444 less than last year. On the other side of the account, the dividends on the Union des Gaz shares held by the Company amounted to £64,124, which was an increase of £2158—due chiefly to the dividend on the 4000 shares of the recent issue which the Company had taken up. The profits at Messina and Montargis were £303 more; and there was an increase of £564 under the head of interest and sundries. In the profit and loss account—after placing £2521 to the credit of the reserve fund—the total amount available for distribution was £76,426, against £73,146 in 1907; and if the proprietors sanctioned the payment of the final dividend of 3½ per cent., £11,126 would be carried forward, as against £7846—that was £3280 more than in the past year. The reserve account had been raised from £40,000 to £50,000; the increase of £10,000 being obtained by taking the £2521 just mentioned from the amount brought forward last year, and £7478 from the sum received from the Union des Gaz for the Montargis concession and works. He thought the proprietors would not be dissatisfied with the result of the past year's work. They would receive the same dividend as in 1907; but the financial position was stronger, for the reserve was increased, and a larger amount was carried forward. It might be urged that the dividend might have been ½ per cent. higher. His answer to this was that, in view of the ever-increasing wages in Italy, and for many other reasons, it would not have been wise to pay a higher dividend; and he thought that—after the proprietors had listened to what he was about to say regarding the Union des Gaz—they would share this opinion. For, prosperous as that Company were, their very prosperity compelled the Directors to increase the capital expenditure, with a consequent increase in the interest that would have to be paid on the large amount they were raising, and would have to raise in the near future.

PERSONAL CHANGES.

Before, however, referring in detail to the affairs of the French Company, he wished to say a few words about one who had lately passed away, and who, although little known to the proprietors, from his position and ability exercised a potent influence for good in the affairs of the Union des Gaz. M. Salanson, the President of the Company, was a very able man. As an old Gas Manager, he was thoroughly acquainted with the technical details of gas making; as a colleague, he was most agreeable. The French Company by his death had suffered a great loss. With the unanimous assent of the directors and shareholders, M. Weill-Goetz, one of the French Directors—who had had a long connection with the Company—had been elected President of the Union des Gaz; and his past experience as a Gas Manager, and as a man of business, fully justified his fitness for the high office. M. de Savignac, who for many years had been the industrious and able Secretary of the Company in Paris, had been elected to fill the vacant seat on the Board.

AFFAIRS OF THE UNION DES GAZ.

And now about the affairs of the Union des Gaz. As the proprietors were aware, that Company issued last year 20,000 £20 shares; and they, the Continental Union Gas Company, subscribed for 4000 of the shares, making their total holding 40,847 out of the 70,000 shares which (with obligations) constituted the capital of the French Company. The greater part of the calls on last year's issue had been paid; and as the final call was due on Dec. 31, all the 20,000 new shares would by that date have been paid for in full, and these shares would, on Jan. 1, receive the full dividend. The profits earned by the French Company during the year under review had been lower than in the previous year; and this diminution was owing partly to the increased interest due on the new issue, but chiefly to the strike which took place at the Italian stations last autumn, to the increased cost of labour, the higher price of coal, and also to the stagnation in trade which, for some time, had existed in the South of France.

LABOUR UNREST AND WAGES.

When he last addressed the proprietors, he entered fully into the causes which led to the strike; and it was undesirable to dwell again on this subject. But he might mention that, during the past twelve months, the Italian workmen had been relatively quiet. The Directors had endeavoured to meet their wishes in a friendly spirit; but should their demands increase—which was not improbable—they would have to take a firm stand, and give them clearly to understand that no further increase in wages for the present could be granted. In the latter nine months of the year under review, they paid these men about £7000 more than in the previous year; and it must be borne in mind that they did less work than workmen of the same category in France, Germany, or England, that the scale of their pensions was a liberal one, and that when they were ill, they received sick pay and medical advice provided by the Company.

COAL, COKE, AND TRADE.

As he had said, coal cost more last year; and although the price received for coke was satisfactory, yet the net result—due to the mild winter—was that the coal bill was £22,000 higher than in the preceding twelve months. As for the stagnation in trade, its causes and effects were as well known to the proprietors as to him. At present, this stagnation was almost universal in Central Europe; and they could only hope that the tide would soon turn, and that a more prosperous era would set in.

DIVIDEND, INCREASING BUSINESS AND CAPITAL EXPENDITURE.

Notwithstanding all these adverse circumstances, the net results were satisfactory. The dividend of the French Company, including the dividend on the increased capital, had been maintained. They had paid off £40,780 in drawn bonds; and the interest on the bond capital had been paid. The business of the Union des Gaz, as shown in the report, was continually increasing—in fact, he wished it would not increase quite so quickly, especially in the great cities. This led him to the question of capital expenditure. As was stated in the report, the amount debited to capital during the year was £156,821. But besides this sum, about £250,000 had been spent on the new works at Milan and Genoa, and on enlargements at other stations, which would not be included in the capital outlay till the work was completed. This large expenditure, coupled with the estimated cost of further extensions—extensions forced on the Company by the ever-increasing demand for gas—had rendered it necessary for the French Company to procure fresh capital, and power was obtained at the general meeting of the Union des Gaz held in Paris on Oct. 26, to make a further issue of bonds, as and when required.

THE NEW WORKS IN ITALY.

The proprietors might rest assured that these large sums had been well spent; and he could only wish that if any of the proprietors were contemplating a journey to Northern Italy, they would visit the new works at Milan and Genoa. In the former city, there would be seen at the Bovisa station extensive grounds, sufficient for a works of the capacity which before long would be required. One retort-house, with all the most up-to-date machinery, was now built, and giving satisfactory results, and a second would be constructed immediately. If they passed on to Genoa, situated in a picturesque valley at Gavette, they would find a still more interesting works; for here Mr. Phillips had placed sixty vertical retorts with all the necessary exhausting, washing, and purifying plant. In fact, this was a model works, and was well worth careful inspection. Great credit was due to Mr. Phillips, who had designed them, as well as the works at Bovisa. The Deputy-Chairman (Mr. Tendron) had visited these stations last spring; and Mr. Birchenough and he (the Chairman) carefully inspected them in October. They were very pleased with all they saw; and were of opinion that, if the local Engineers were able to drill the men properly, there would be every reason to hope that the results would justify the expenditure.

THE FUTURE.

Looking to the future, and without being too sanguine, he thought they were justified in hoping and believing that the coming year would be prosperous—that was, always assuming that they were spared labour troubles. Coal, the all-important factor to be taken into consideration, was not rising in price—in fact, the Directors had been able to conclude contracts at lower prices than last year. The gas sales, as the proprietors saw, maintained a steady increase; and altogether there was every reason to look forward confidently to the future.

IMPRESSIONS OF IMPROVED AND NEW WORKS.

Mr. J. H. BIRCHENOUGH, C.M.G., said it was customary to second the resolution in merely a formal manner. But as he had the privilege of accompanying the Chairman to Italy during the autumn, he hoped the proprietors would allow him to say a few words regarding what he saw. Mr. Tendron visited the station a little earlier; and it was by his courtesy that he (Mr. Birchenough) was permitted to make these remarks. The Chairman and himself visited the Milan and Genoa works in October; and as the Chairman had already stated, they made the most careful and prolonged inspection of the works and of the general administrative position. Respecting the property in Milan, they found the works of San Celso immensely improved in comparison with the position seen twelve or fifteen months before. These works had cost a large amount of money; but there were certain defects in design which had since been corrected. The Chairman, Mr. Tendron, and himself were delighted to see the great improvement in their general arrangement, in the more economical method of their working

and, what was most important of all, in the spirit of the men upon whom they depended for the operation of these great works. At Bovisa they found a site of extraordinary capacity and situation for the construction of a great works. Only the first units of plant had so far been put on the ground. These units were admirably planned; and, though in the early stage of their history, they were working smoothly and well—the small defects which machinery always developed in the early days of its working having been corrected. The Directors were also pleased to see that their Managers had succeeded in running the works with a smaller number of men. As the proprietors knew, in Italy they were compelled, under the "Organico," to employ more men than were really required for the works, but the opportunity had been taken at Bovisa for reducing the number. Mr. Phillips had been responsible for these works; and he (Mr. Birchenough) joined most cordially with the Chairman, in expressing their admiration for the manner in which he had both designed and carried them out. He was sorry to say they had had a good deal of work on the administrative side in Milan. They were losing the services of their friend, Director, and Agent-General there, M. Lacombe, whom they had often spoken of at these meetings with respect and admiration. He was a man difficult to replace; and they had some trouble in arranging the administrative system in a manner that would diminish to the least possible degree the loss sustained by the departure of M. Lacombe. He hoped things would go smoothly in Milan. They had a considerable number of good men there, who were devoted to their interests; and so they had excellent reason for believing that the re-arrangement would work satisfactorily. While in Milan they visited the fine new offices which the Company had erected. The offices were an economical building, admirably planned for their purpose; and the Directors were exceedingly satisfied with the manner in which the work had been carried out, and with the adaptation of the buildings to the administrative functions of a great gas company. At Genoa, they inspected the works with much care and detail. At the works of Sampierdarena, where there had been a considerable amount of trouble, they found things vastly improved. Mr. Morton, the Manager, was a man of true British strength and character; and he was performing his work admirably. He was supported by a staff which was giving satisfaction. He had with him Mr. Cesari and Mr. Cucchi, who took the administrative side; and these three officers were working with remarkable cordiality, and with results which he (Mr. Birchenough) was sure the proprietors would see reflected in the accounts in the next two or three years. The Directors also visited the new works at Gavette. He was told they would never again see them in the dainty condition they were in then. He had a considerable experience of gas-works in various parts of Europe; and he had never seen works which represented to him so completely the ideal of a compact and workmanlike gas-works. The greatest admiration was due to Mr. Phillips for the manner in which he had planned and carried out the construction of these works. As perhaps many of the proprietors knew, the carbonizing plant was entirely on the vertical retort system. The machinery was all in place ready for operation; and last week the Board heard that the works were running with remarkable smoothness. He should like to say a few words regarding the manner in which the works had been executed by the German contractors. The construction could not possibly have been better done by anyone than it had been by the Stettiner Company. Altogether, the Directors came back from this visit to the Italian stations very consoled and satisfied with the condition of the property. It was approaching what it should be; and so far as works and administration were concerned, the future ought to be a bright one.

Italian Workmen and Co-Partnership.

Mr. Walter Hunter said he had listened with great satisfaction to the addresses of the Chairman and Mr. Birchenough; and he could see the Company were increasing in prosperity. But there was one thing the Chairman held out before them; and he had held it out on former occasions—that was, further labour trouble. He should seriously suggest to the Board whether they could not introduce into Italy—difficult as he knew it would be—some scheme of co-partnership. He knew he would be met by the answer that it would be impossible for Italian workmen. When the late Sir George Livesey first started co-partnership in the South Metropolitan Gas Company, he (Mr. Hunter) talked over the matter with one of his colleagues of the Commercial Gas Board; and he said it would be impossible to do the same thing for the Commercial Company's men, because they were all unionists. He (Mr. Hunter) thought the word "impossible" ought not to be in their dictionary. He had read with great interest the speech that Mr. Balfour delivered the other day on co-partnership; and he should like to quote a few words from it. He said:

> Where co-partnership schemes have been tried under favourable circumstances, where they have been tried under the guise of wise, public-spirited, and, let me add, business-like persons, those experiments have been a success; and nobody can survey the field, and see what has been accomplished in France [that was the point he, Mr. Hunter, wished to emphasize], in this country and elsewhere, and truly say that co-partnership is still an untried experiment—a plan which looks well on paper, a method of dealing with industrial problems which may commend itself to the theorist, but which the practical man repudiates. That is not so.

It seemed to him (Mr. Hunter) that in Italy they had everybody against them. First of all, they had the Government often against them; the Municipality, as a general rule, took much the same line; and they had the workmen against them. If they could only take some steps to bring the workmen on the Company's side as had been successfully done in South London, and in his own Company, the Commercial, and as was now being greatly extended throughout the country—in the Tottenham Company, for instance—he was sure the result would be beneficial. In the Commercial Company, they had now: Stock acquired by the men through profit-sharing, £16,911; amounts lodged with the Company, over £15,000; and stock prior to the addition to the other stock of about £6000—making a total of, roughly, £39,000 financial interest by the men in the Company. When they got men to take an interest, and a real interest, in a Company like that, they put in them a sense of honour and made them loyal. With great submission, he ventured once more to urge the Board to take this most important matter into consideration.

Mr. E. A. Goulding, M.P., congratulated the Directors upon the satisfactory nature of the report, and of the interesting statement by Mr. Birchenough on the visit to Italy. He was gratified with the proceedings that day, because it was the first time during the past three years that there had been no ill-forebodings held out from the other side of the table regarding further labour troubles. He believed the best way to meet labour difficulties was by having a good Board and a good reserve. He believed it had a safeguarding effect upon their staff to know that the Board were in a strong financial position to meet any emergencies. Mr. Hunter had spoken of co-partnership; but he (Mr. Goulding) believed that much good was done by developing, as the Great Eastern Railway Company had developed, benefit societies, in connection with which the workpeople incurred great risk if they fell out with their employers. As to the accounts of the Union des Gaz, he noticed that in the previous year £12,000 was added to the sinking fund; but he did not know whether the words in the paragraph in the report which stated that, "after providing debenture interest and debenture redemption," &c., included that amount. As to the Messina debt, he should like to know what were the prospects of receiving that and liquidating it from the accounts. The £36,000 was the only bad item in their accounts.

Mr. F. J. Butcher asked how many years the debt represented.

The Chairman remarked, with regard to what Mr. Hunter had just said as to co-partnership, that he (the Chairman) confessed he was with him in spirit; and if anything could be done, the Board would do it. But he would ask the proprietors not to desire him to say anything more definite on the subject that day. It occurred to him that the difficulties of introducing the scheme in Italy would be far greater than the difficulties in any other place in Europe. The Italian workmen were of a different character. There was so much jealousy and misunderstanding between the different categories of the employees. At the outset, they would be met with objections that would not obtain in English works where there was thorough good feeling, especially in those works where co-partnership has been introduced. The Directors, however, would do what they could. He quite agreed that the words "difficulty" and "impossibility" ought never to exist; and inquiry ought to be made to see what could be done. As to Mr. Goulding's question regarding the amortization fund of the Union des Gaz, the £12,000 to which he referred was not included this time in the amortization account. As to Messina, they had done all they could to obtain payment of the debt, which had existed now for some three or four years, and £10,000 had been paid during this year. Their local Engineer (M. Ruggeri) informed them that the Municipality would pay when they could; and the Board had also received the intelligence that the authorities were going to Rome at once in order to obtain permission to raise a loan.

The motion was unanimously carried.

On the proposition of the Chairman, seconded by Mr. N. E. B. Garey, a dividend was declared (less the interim payment) of 7 per cent. on the preference stock (less income-tax), and 6½ per cent. on the ordinary stock (free of income-tax).

The Deputy-Chairman (Mr. F. Tendron) proposed, and Mr. R. Hesketh Jones seconded, the re-election of the Chairman and Mr. A. F. Phillips to their seats at the Board.

The motion was cordially agreed to.

Moved by Mr. Harris, and seconded by Mr. Goulding, the Auditors (Messrs. A. T. Eastman and C. P. Crookenden) were reappointed.

Mr. A. F. Phillips moved a hearty vote of thanks to the Secretaries, Managers, Engineers, and Staffs of the Continental Union Company and the Union des Gaz in London and abroad. He eulogized the work of Mr. Martin, of M. Savignac in Paris, and of the several Engineers and Managers. They were devoted to the interests of the Company; and the whole of their attention was given to obtaining the very best results. Only those who met these gentlemen could form any idea of the difficulties with which they had to contend, especially the Engineers and Managers in Italy.

Mr. R. S. Gardiner seconded the motion, which was heartily passed.

Mr. Hunter, in moving a cordial vote of thanks to the Chairman and Directors, said a few weeks since he saw the vertical retorts at work to which reference had been made; and he had never seen anything in connection with gas making that had pleased him more.

Mr. Cave Orme seconded the motion, and expressed the regret of the proprietors on learning of the death of M. Salanson, and of the resignation of M. Lacombe.

The motion was cordially adopted.

The Chairman made acknowledgment of the vote, and this concluded the proceedings.

BRITISH COALITE LIMITED.

The Great Hall at Salisbury House was well filled with investors in Coalite on the occasion of the meeting last Wednesday—when Mr. Albert G. Kitching, J.P., presided, and had with him on the platform his colleagues Sir W. H. Preece, K.C.B., F.R.S., Sir Charles Allen, Sir W. H. Bailey, Mr. A. C. Cory-Wright, Mr. James Conchie, and Mr. H. Wynne Pugh. Professor Vivian B. Lewes was also seated at the Directors' table. The proceedings were of considerable length.

The Financial Tie with Coalite Limited.

The Chairman, in moving the adoption of the report and accounts, said the first item he thought that called for attention was the amount of the shares that had been forfeited—£29,104. These belonged to five shareholders; and under the circumstances attaching to them, it was considered that they should be forfeited. The next item was the deduction from the capital issued of calls in arrear. This amounted to a considerable sum; but out of the total amount £239,000 was owing by Coalite Limited, which left £5000 by other shareholders. Of this, £3548 had been received since the accounts were made up. For the

sum owing by Coalite Limited, the Company held as security a mortgage on all their foreign patents and £250,000 of the deferred shares which were to be handed to them in payment for the patents. The Board felt no anxiety on this point. No additional capital had been required; and until Coalite Limited discharged what they owed, they were paying 5 per cent. interest on the sum. Another item was interest accrued to the Company under agreement on calls in arrear on shares held by Coalite Limited, £11,400. This, he thought, would be received in a short time, because Coalite Limited had taken powers to issue some new shares, and the Directors had made arrangements by which a certain portion of the calls should be handed to the British Company. It was quite possible he might be asked why the Board accepted Coalite Limited for such a large number of shares. Coalite Limited underwrote £750,000 of the shares when the British Company was floated. They had a considerable number of sub-underwriters; but owing to the vile attacks which were made upon this Company at the time of its flotation, a considerable number of these sub-underwriters withdrew from underwriting, and left Coalite Limited to face the position. This was why they were bound to accept Coalite Limited for such a large amount of underwriting. Further financial questions having been dealt with, the Chairman referred to the question of

THE COALITE PATENTS.

At the statutory meeting of the British Coalite Company, which was held when the Company had been but three months in existence, the minds of the shareholders were somewhat disturbed by the allegations—the very virulent allegations—put forward by those who did not believe, and those who did not want to believe, in the process. These were to the effect that it was not good subject-matter for a patent, and that, even if one were secured, the process would be wholly invalid and ineffective. In the period that had elapsed since that date, many things had happened, and among the most satisfactory had been the fact that events had entirely borne out the correctness of the view the Board took with regard to the patents, and had shown that the fears so freely expressed with reference to them were entirely unfounded. Not only had the English patent been granted, but those most captious of critics, the German and American Patent Offices, had also accepted the specification and issued letters patent. Many other important countries had followed suit; while numbers of subsidiary patents, for various improvements in apparatus and methods, had also been granted. The Directors now felt that the interests of the shareholders were not only safe, but overwhelmingly so in regard to the patent position. Moreover, their main claim had been added to by several other discoveries which, in the Directors' judgment, were as important as the original, and which, being patented, greatly strengthened the position. The whole gist of the process was to get an absolutely uniform material, easy to ignite, smokeless in combustion, and yet giving a cheerful flame; and this could only be done by low temperature carbonization under the coalite patent.

EXPLANATION OF SLOW PROGRESS.

He had no doubt that some shareholders were disappointed at the relatively slow progress that had been made, from a commercial point of view. With this feeling, he had a large amount of sympathy; but he thought he should be successful in showing that this delay had been greatly to the benefit of the shareholders. Had the Board wasted their money by erecting machinery which, their further experience proved, would soon have had to be scrapped, instead of availing themselves of improvements which their Engineer (Mr. Parker) discovered—had they so acted, they would have deserved condemnation. He (the Chairman) said at the last meeting that Mr. Parker was giving his attention to cheapening and expediting the making of coalite. In this he had been absolutely successful. At the time of the last meeting, the coalite plant at Wednesfield consisted of a battery of flat iron stills, and the carbonization took from eight to ten hours to complete. A long investigation having been made, it was found that the use of tubes, 5 inches in diameter, admitted of a reduction of the time needed, from ten hours with the flat stills to under four hours with tube stills; and afterwards that, in order to secure stability and uniform heating, it was better to cast these tube-stills in solid bunches of twelve, the conducting power of the metal leading the heat more regularly round the material in the tubes, while the mass of metal stored the heat and helped to keep the temperature constant, which led to a further reduction, to three hours, of the time needed for carbonization. At the time this important work was progressing, great improvements were being made in the methods of charging and discharging by the introduction of hydraulic gear, which largely reduced the amount of labour required, and thus still further lessened the cost of production. Work of this kind took both time and money. But in establishing a large industrial concern like British Coalite, the foundations must be built securely and carefully, or grave mistakes would be made, which would be most costly to remedy. When the Directors saw the bearing which the reduction of time and labour factors had upon the cost of production, they felt that it would be the worst policy to continue erecting stills, which would in a very short period have had to be scrapped, to make way for the newer form of plant. The truest policy to adopt was the work of standardizing the plant, and bringing its manufacture to such a pitch of perfection that it could be multiplied to any desired extent without loss of time. The past year was not a satisfactory one from the point of view of the shareholder who desired immediate dividends; but it was most satisfactory in its importance and far-reaching effects upon the coalite industry, and for this reason: With every part of the apparatus now standardized, they were ready to go forward at a rate which would have been impossible had they devoted themselves to the erection of imperfect plants, in order to show some immediate large return in material made, instead of, as had been the case, spending the time in reducing the whole of the process to a condition of automatic regularity.

PROFITABLE UTILIZATION OF GAS NECESSARY TO SUCCESS.

The fact that the output of coalite at the present moment was so small demanded some further explanation. It might be urged that they ought to have been utilizing the Barking site for the manufacture of coalite on such a scale as to have had a large and constant supply for the London market this season. But had they hurriedly erected huge plant at Barking on the old principle, the large economies effected by the improvements in plant since made would have necessitated it being thrown aside in a short time, and the new and economical plant installed in its place. Further, there being no outlet for the utilization of the gas produced, it would have had to have been blown to waste—a procedure which would have cost the shareholders many thousands of pounds; and coalite under these conditions could only have been manufactured at an infinitesimal profit, which could have been more than swallowed up by the expenditure on the temporary plant. It was clear, therefore, that until the improved installations could be erected and the gas utilized, it was far better, in the interests of the Company, to devote the time to the work of standardizing and perfecting the plant, and erecting it only as quickly as work could be found for the gas. The result had been that only one unit of stills had been erected, and was working, at Barking, in order to give some coalite to keep the interest in it alive. At the same time, a Bill for supplying power gas over a large area of Essex was prepared for presentation to Parliament; but the electric power schemes brought forward during the past and present sessions offered such possibilities for utilizing the gas for power purposes, that it was thought better to withdraw the Bill for the time being, and await the development of these schemes, which embraced the bulk supply of electricity to London, from a power station on a site adjoining the Barking property, and taking a portion of the land. This large scheme was rejected by a Committee of the House of Commons towards the end of last month. But the British Coalite Company would be in a position to supply power at a cheaper rate than was proposed by that scheme to those who choose to come to them, and to establish their factories on the Company's or on adjoining land. The Company would not require parliamentary power to render this service; and they would be able to do it as soon as it was wanted. This meant the supply of power on the banks of the Thames, at Barking, cheaper than that supplied at any other power station in the world. He need hardly say the Directors regarded this as a most valuable bye-product. At Wednesfield, the conditions to which he had referred influenced them in their operations. They had now there in the power-house gas-engines generating electricity, which was used in the manufacture of ferro-silicon in electric furnaces, and in several electrolytic processes, which should yield large profits, giving a considerably higher value to the gas than even if used for illuminating purposes.

THE COMPANY'S FOUNDRY.

Another matter to which the Directors attached great importance was the erection of a foundry. With the introduction of the tubular still, trouble was experienced in getting founders who would undertake the work, and their delivery was so uncertain that, under the advice of their Engineer (Mr. Parker), the Directors decided that the best thing to do was to erect their own foundry. At the present moment, they had at Wednesfield a foundry, 314 feet long by 61 feet wide, thoroughly equipped with the most up-to-date plant, and, in full work, turning out about 21 bunches of one dozen tubes each per week, each capable of carbonizing 560 tons of coal per week. Already further extensions were being made which would double the quantity it was now possible to produce. The Company were able to accomplish this at such a large saving in cost, that the Board were thoroughly satisfied with the step taken. The idea for Wednesfield was to make it a manufacturing centre for the turning out of coalite plant, and also to have there the whole process at work, with tar distillation and the various applications to which the residual products could be put, so arranged that the whole process from start to finish could be demonstrated to anyone desiring information on the subject. Visitors to Wednesfield could now see not only the foundry turning out the bunched-tubes, but the sets of stills, illustrating the several phases of improvement the plant had undergone; also a plant of the most modern type, giving about 5000 cubic feet of gas per ton of coal, and carbonizing 60 tons of coal in the 24 hours; and further, the distilling of the tar (produced at the rate of about 23 gallons per ton of coal), and the utilizing of the gas not only for burning, but also in the big power house with its range of electro-chemical laboratories attached.

THE PLANT AT THE PLYMOUTH GAS-WORKS.

In the report the Directors said: "The installation of coalite plant at Plymouth in connection with the contract with the Plymouth and Stonehouse Gas Company is well advanced; and the Directors are advised that these works will be brought into operation in the month of January." The Company were erecting, under the contract referred to, a plant for supplying half-a-million cubic feet of gas per diem to the Gas Company, and turning out over 100 tons of coalite daily, while the plant was capable of being worked to considerably more than that capacity. The Board had made the contract with the Plymouth Gas Company, on terms most favourable to them and both profitable and useful to the British Coalite Company. The Gas Company were very enterprising in making this arrangement; but he (the Chairman) and his colleagues had learned so much since that they had no intention of offering any other gas company similar terms. He thought they were nearing the end of this condition of affairs. Sir Joseph Bellamy, the Chairman of the Plymouth Gas Company, and Mr. P. S. Hoyte, their able Engineer and Manager, thoroughly satisfied themselves that there was something more in the coalite process than the generality of gas companies chose to consider possible. The plant at Plymouth would be subjected to the most searching and careful scrutiny by the officials of the Gas Company, and all who desired would have the opportunity of judging how far the claims made for low-temperature carbonization could be justified by practical results. When it was seen that the Company's statements had in reality erred in minimizing, rather than exaggerating, the advantages to be derived by this method of carbonization, he felt sure that all false feeling and friction between them and the gas companies would disappear, and that not only would they attain their desire of gaining centres of production for coalite throughout the country, but the gas companies and the public also would benefit by having a cheaper and a purer gas supply. He was strengthened in this conviction, and placed it before the shareholders all the more strongly because the Board knew what the process would

achieve, and also because they had had as visitors at Wednesfield, many representatives of some of the most important gas and carbonizing institutions on the Continent; and in every case those who had come to curse had gone away with a distinct desire to bless. Long before the next meeting, he anticipated Continental developments would have placed the Parent Company—Coalite Limited—in a perfectly unique position; and in this he was confirmed by the opinions of Continental and American experts, whose lives had been devoted to the study of carbonization. Although the direct benefits might not accrue to the British Company, the wide victory of the process would largely enhance the value of their property. Negotiations were already taking place between them and the Parent Company, by which the Board hoped to secure considerable profits as manufacturers of a good deal of the plant employed.

THE BYE-PRODUCTS OF COALITE.

There was another branch of their industry to which he had not yet referred, and which had an important bearing on their prospects. That was their bye-products. He would not attempt to go into the scientific issues which had opened up, though these were most interesting; but he would remind the shareholders that in manufacturing coalite, they, at the same time and by the same process, made gas and tar. He had already spoken of the former, and of the great value of it. The tar—of which they made a large quantity—could be dealt with in two ways. They could sell it as low-temperature tar, and obtain a high price for it, or they could distil it themselves. There was much to be said in favour of both ways of dealing with it; and the Board were giving this point their most careful consideration, so that they might arrive at a right decision. It was interesting to note that, during the process of tar distillation, which yielded motor-spirit, solvent naphthas, disinfectants, and carbon-free pitch for insulating purposes, there was also a large proportion of oil, fulfilling the Government requirements for the liquid fuel which they required for the Navy. Both as to flash-point and efficiency, this oil met their wants; and as some 7 gallons of this liquid fuel could be obtained for every ton of coal carbonized, it was clear that the Company had in this and other bye-products a most valuable asset.

Sir W. H. PREECE seconded the motion.

SHAREHOLDERS' CRITICISMS.

There were only a few points with which we are much concerned in the criticisms of the shareholders. One speaker—Mr. Harry Fisher—reminded the Chairman that in the prospectus it was stated that the Company had several applications from colliery proprietors who were anxious to use the Parker process; and he was curious to know if any of these had materialized yet. To the same gentleman it was a bit disquieting to learn that had the Company gone on the lines as originally intended, the bulk of the plant would now have been on the scrap heap. If the first "tackle" was wrong, was it not possible the second was also wrong? From the trumpery 100 tons of coalite a day to be produced at the Plymouth Gas-Works, he did not think there was going to be much provision for dividend on three-quarters of a million of capital. The underwriting question formed a big topic for discussion; and the same shareholder pointed out that £45,000 had been spent for underwriting commission, and therefore he thought they had a right to ask the underwriters to hurry up. Another shareholder was for having recourse to legal proceedings. In a criticism regarding the putting down of a foundry at Wednesfield for the construction of the tubular "stills," the opinion was expressed that the life of the stills was not going to be very great. Another speaker was a chemist; and he looked upon the system as an epoch-making invention. The attraction to him was evidently the high illuminating quality of the gas, and the richer character of the tar than that of the gas-works variety. But he did not seem to have much personal knowledge on these points; his instruction savoured of a study of a celebrated Cantor lecture. It was gathered from the Chairman's reply that nothing had yet issued from the negotiations with colliery owners for the use of the Company's plant. He justified the putting down of the foundry by saying that they were making the tubular stills at half the cost that other people were charging for them. He hoped before long there would be a considerable quantity of coalite on the market.

The motion was carried; and the re-election of one of the firms of Auditors (a second firm did not offer themselves for re-election) concluded the meeting. The shareholders omitted to thank the Chairman and Directors for their services; and the Directors seemed pleased to take advantage of the earliest opportunity for getting quit of the irksome duty of having to face the shareholders, with so little for presentation that was cheering.

Much adverse criticism has been called forth in the Daily Press as the result of the issue of the Company's report. For instance, the "Westminster Gazette" last Friday week said: "The British Coalite Company was considerably criticized upon its formation; and it cannot be said it has as yet made great strides to prove that coalite is going to fill, as they say in the classics, a long-felt want. It is true that coalite cannot be sold in bulk before it is made in bulk; but we should have thought it a wise policy to have got to work a little quicker, as educating the populace may be a very tedious task, particularly in Midsummer. According to the report, two units of coalite plant are in operation in Wednesfield, and the first unit at Barking is also producing, while a foundry has been erected in order that the Company may manufacture its own plant, and an installation of coalite plant on a large scale at Plymouth is well advanced. This would be good if the kingdom were clamouring for coalite; but, as far as we know, it is not, and it will be uphill work to create the demand. The result of working to date is a debit balance of £44,582; and the large sum of £243,900 appears in the balance-sheet as calls in arrear. Of this, it would appear that £236,000 is due by Coalite Limited, and the Parent Company proposes to increase its capital by an issue of shares at £4 premium. The present £1 shares of the Parent Company are quoted at 5⅛, and £4 premium would represent £5. The price of the British Coalite Company's shares is 11s. 6d.; so things do not look particularly brisk." The day after the meeting, our contemporary again referred to the matter, saying: "It is not surprising to see signs of dissatisfaction with the annual report and accounts of Coalite Limited, especially on the part of those who purchased the shares at colossal prices; for they are reasonably beginning to wonder whether they will ever see their money back. Messrs. Taylor and Dorté, solicitors, of Billiter Street, have had their attention brought to the Company's position by a client who bought £1 shares at upwards of £30. They 'understand that others have also purchased shares at high prices; and to these persons the state of affairs shown in the accounts cannot be satisfactory.' As all the Directors are retiring, the firm is instructed to ascertain what support would be forthcoming to a proposal to elect a Director or Directors who would be independent of the promoting interests. No harm can be done in endeavouring to test the feelings of other shareholders on the point; and those who are of the same way of thinking cannot do better than communicate with the solicitors at 18, Billiter Street, E.C."

MINES (EIGHT HOURS) BILL AND COAL CONSUMERS.

Bill to be Opposed in the Lords.

An Emergency Meeting of the Coal Consumers' Defence League was held last Wednesday, at the offices of the Shipping Federation, St. Mary Axe, under the presidency of Lord NEWTON, to protest against the Coal Mines (Eight Hours) Bill.

The CHAIRMAN, in opening the proceedings, said the more the Bill was considered the more objectionable it appeared; and the really surprising feature in connection with it was that its character had not been more widely realized throughout the country. He was afraid there was a very remote probability of their views receiving much attention in the House of Commons. He had no doubt that the Bill would be passed through the House by a mechanical majority; but before long it would make its appearance in another place. What the reception of the Bill in the House of Lords was likely to be, he was not prepared to say, but he had little doubt as to how it would be dealt with; and he proposed, without having consulted any others with regard to the matter, that, if nobody else did so, he would move the rejection of the measure. He hoped all those who were present, and whose interests were seriously threatened, would make a plain statement of their case. He would specially urge that no exaggeration should be made. He must say he had a lurking suspicion that the case against the Bill had occasionally been over-stated. There was no need to do anything of the kind. The Bill was sufficiently dangerous, and the case against it should be stated in the baldest and simplest fashion possible.

Mr. TEMPLE FRANKS, representing the Railway Association, moved the following resolution:

> That this meeting of representatives of large coal-consuming industries of the United Kingdom desires to protest, in the strongest possible manner, against the passage into law of the Coal Mines (Eight Hours) Bill. The events which have taken place since the second reading debate in the House of Commons have intensified the profound alarm with which this measure was originally regarded. Since that time the evidence of additional experts has proved beyond all possibility of challenge the statement that the Bill will, in effect, gravely increase the cost of coal to the commercial community and to individual consumers. On the other hand, not a single expert has come to the aid of the Government in support of the allegation—half-heartedly advanced—that the Bill will not operate harshly on the consumer. This meeting desires to call the attention of the Government to the fact that practically the whole commercial community of the country is bitterly opposed to the Bill, and once more prays the Government, even at this eleventh hour, to decline to advance any further the selfish and sectional demands of the miners at the cost of the whole of the rest of the community.

In support of the resolution, he said there was absolutely no justification for the introduction of the measure. They were forced to the conclusion that the Bill was brought in by the Government under pressure from the miners, for ulterior reasons—to secure higher wages, or as the thin end of the socialistic wedge for an eight-hour day all round. Next to the shipping companies, the railways were the largest consumers and the largest carriers of coal. It was perfectly obvious that, in whatever form the Bill passed, it must end in a diminution of output and in the consequent increase of price. Every one of the industries which depended upon coal must suffer, and the cost of their working expenses would naturally be raised. The railways would be the first in this case to feel the effect, as they consumed last year 16,101,000 tons of coal. Not only the shareholders and the public, but the railway worker would suffer from the depression.

Mr. J. F. MASON, M.P. (Iron and Steel Industries), in seconding the motion, said that what they had to fear most was not the permanent increase in the cost of production, but the increase in the first year or six months, which might seriously dislocate the industries in which coal was a raw material. The late Sir George Livesey had shown that even the fear of a shortage in the supply of coal had caused the price to rise. An increase of 2s. on a ton of coal meant 7s. on a ton of steel; and this would enormously increase the difficulty already experienced by England in competing with other nations in the markets of the world.

The resolution was also supported by Mr. L. Martin (London Waterside Manufacturers), Mr. Stanley Jones, the Engineer of the Commercial Gas Company (Gas Companies), Mr. F. S. Watts (Shipping Federation), and others.

Sir F. BANBURY, M.P., declared that the Labour members were at the back of the Bill, and were pressing it with the object of introducing other Bills to limit the hours of labour for every class of workmen in the community. The Bill was one of class legislation of the worst kind; and the House of Lords should show that the country could place reliance upon them to defeat such legislation.

The resolution was carried unanimously.

A manifesto has been issued, on behalf of the League, in opposition to the Bill. In the course thereof, it is stated that "the Government

have at once astounded and dismayed the commercial community of the country by their determination to press forward the 'dearer coal Bill.' . . . The one great fact which the Government are powerless to refute is that coal will undoubtedly be much dearer as the result of their Bill. Colliery managers and colliery engineers are practically unanimous on the point that not only will the increased cost of production be grave, but also that there will be an additional rise in the sale price owing to diminution of output. . . . Liberals such as Sir Walter Runciman, Sir Hugh Bell, and the late Sir George Livesey have warned the nation against the direful consequence which must ensue. On the one hand, we have practically every expert in the country, irrespective of party, condemning the Bill; on the other, we have a handful of self-interested colliery leaders who have no knowledge whatever of coal prices. . . . The miners are making a deal with the Government to secure preferential treatment at the expense of everyone else; and the Government are, in effect, levying a special tax, in the form of increased coal prices, in order to satisfy the demand of the miners. Already the miners, not satisfied with the promise of an eight-hour day, are clamouring for a five-day week, and also for a higher basis of pay. They are frankly out for loot. Nor can the Government be in ignorance of the real position. While the dearer coal Bill was in Committee, the strongest opposition was levelled by the miners' representatives against every proposal put forward to safeguard the interests of coal consumers."

The Employers' Parliamentary Council, representing central associations and federations of employers in the United Kingdom, have sent to all members of the House of Lords a circular-letter urging the rejection of the Bill, on the ground that its provisions are "contrary to public policy, and prejudicial to the interests of every trade and industry." The following arguments against the Bill are set forth: "It is a violation of a right that has always been rigorously safeguarded in this country—the right of a man to work as long as he pleases. It is admittedly the first step to a general law fixing and regulating the hours of labour in all industries, and ultimately the fixing and regulating of wages. It seeks, at the expense of the whole coal-consuming community, to benefit a special highly-paid, and by no means overworked, class of workmen, who are well organized, and, as experience has shown, quite able to safeguard their own interests without the aid of legislation. It is a measure that (outside the ranks of the minority who believe they will profit by its provisions, and of the Socialist-Labour party) has been universally condemned—not a single public meeting having been held in its favour. At all bye-elections during the year, the Bill has largely influenced the feeling of opposition to the Government; the measure being regarded by the majority of electors as a piece of class legislation of the worst form."

THE PROPOSED FEDERATION OF THE POTTERIES.

Disapproval of the Local Government Board's Scheme.

A Select Committee of the House of Lords, presided over by the Earl of Cromer, concluded last Thursday the consideration of the Local Government Provisional Order Bill for the federation of Tunstall, Burslem, Hanley, Stoke, Fenton, and Longton, which they commenced on Nov 24. At the close of the address by Mr. Balfour Browne, K.C., on behalf of the promoters, the Committee deliberated in private, in order to ascertain whether, without calling any further evidence, they could give a preliminary decision. This they were able to do; and it was subsequently read by the Chairman, as follows: "(1) We approve of the principle of federation. We think the adoption of this principle would be a great advantage to the whole of the community residing in the Potteries. (2) We are not on that account at present prepared to say that the preamble of the Bill under discussion has been proved. (3) We are not prepared to recommend that the Bill should be passed into law without important modification, not only in the minor details, but also on some of the main lines on which the measure is framed. (4) We consider that a settlement which would be fairly satisfactory might be on what has been referred to as the Stoke basis. (5) That basis involves the adoption of two main principles: (*a*) Separate rating areas and differential rating for a fixed period; and (*b*) the abandonment of any attempt to estimate the value of the assets in each district." In further stating their decision, the Committee invited Counsel to consider whether the basis they suggested, which had been proposed by Alderman Geen, could be followed out; and if this could be done, they said they would pass the preamble of the Bill. They would greatly regret if no arrangement were come to.

The Chairman remarked that the Committee thought it worth while considering whether there should be introduced in the Bill provisions for federation during the next twenty years by mutual consent; and it was also very necessary, if that was so, that the Act should define what "mutual consent" meant, as it might mean the majority of the Councils of the towns or the necessity of appealing to the ratepayers. It was manifest that there had been great difference of opinion in the Potteries on this subject. He thought it was no exaggeration to say that the majority of the inhabitants were generally in favour of the principle of federation, however much they were opposed to the particular measure before the Committee. The question of overruling any body of opinion of this nature was a serious one; and such an action would be contrary to the best traditions of English municipal life. The Committee hoped and believed that a certain amount of goodwill would be shown by all parties, and that hope of an agreement such as that which had been indicated need not be abandoned. He paid a tribute to the ability of the President of the Local Government Board, and said they felt their responsibility in declining to follow his advice and also in overriding the decision of the House of Commons Committee. The Committee had now put the position back to that in which it was when the Stoke proposals were put forward. Whatever their personal opinions might be on the merits of the Bill, the Committee thought it essential to get a more or less unanimous vote. He hoped the parties would act with all possible speed, so that the care and attention already spent on the scheme might not evaporate in the delay.

The Committee met again on Friday, under the presidency of Lord Cromer, to hear the result of the conference between the parties as to the possibility of arriving at a settlement.

Mr. Balfour Browne stated that he was quite prepared to modify the proposals he had made, and accept those of Burslem, which were of a very simple character. He abandoned valuation altogether; and on this they were all agreed. It was when they came to separate rating areas that they split. He proposed that there should be a flat-rate for all the six towns, with an equalization rate to be paid by Hanley to Fenton for ten years. This, in a sense, gave different rating areas. The flat-rate would come into operation as soon as the Bill passed. Counsel enumerated his proposals as follows: "(1) From the commencement of the Order, the price of gas and electricity to consumers to be the net cost price. [This, Counsel explained, made these concerns non-profit earning, and was part of the Stoke scheme.] (2) A flat-rate for all purposes, with an equalization rate paid from Hanley to Fenton. (3) No valuation. (4) Current accounts to be discharged. (5) Costs of each town promoting or opposing the Order to be borne by the whole area." This, he added, was not his scheme, but that of Burslem; but he thought that it was a fair one, and was very sorry it was opposed.

The Chairman said the Committee had not decided on the scheme, but they thought it worth while, so far, to go on and hear arguments. Thereupon they were addressed by Mr. Talbot, K.C., for Burslem, the Hon. J. D. Fitzgerald, K.C., for Fenton, Mr. Honoratus Lloyd, K.C., for Stoke, and Mr. Wedderburn, K.C., for Tunstall—all, with the exception of Mr. Talbot, in opposition to the scheme submitted—and then adjourned till yesterday.

THE LIGHTING OF CHARLESTOWN AND LIMEKILNS.

Inauguration of the New Scheme.

The scheme for the lighting of Charlestown and Limekilns with gas from the Corporation gas-works at Dunfermline was inaugurated on Wednesday last—Lady Veronica Bruce, a daughter of the Earl of Elgin, turning on the private supply, and Lord Bruce, his Lordship's son and heir, turning on the supply to the public lamps. Two circumstances make the scheme more than usually interesting—first, that it embodies the system of high-pressure gas supply of Mr. A. Waddell, of Dunfermline; and, second, that Charlestown and Limekilns are townships in the immediate neighbourhood of Rosyth, where the Admiralty are in the course of establishing a large naval station. The Corporation of Dunfermline have laid the gas-main, a distance of about four miles, and the Local Authority have provided all the local piping, and fitted up the street-lamps. The works had all been completed; but no gas had been supplied for use before Wednesday evening.

Mr. Waddell described his arrangement, which was then being laid down, to the North British Association of Gas Managers in July last (see "JOURNAL," Vol. CIII., p. 308). On Wednesday evening it worked most satisfactorily. The installation at present consists of forty street-lamps, with Bray's upright incandescent burners, in square lanterns made by Messrs. R. Laidlaw and Son (Edinburgh), Limited; and gas-meters have been fitted into 150 houses. The compressing plant employed is the arrangement of the Bryan Donkin Company, of Chesterfield. Governors (of Peebles patent make) attached to the services reduce the pressure of the gas to about 3 or 4 inches, as desired. At the gas-works the pressure is taken by a Simmance-Abady "Tape" pressure recorder. On Thursday an experiment was made as to the effect of driving the engine faster; and in three minutes the increased pressure had returned by the return pipe, and slowed-down the engine. The distance, going and returning, was eight miles.

The members of the Corporation of Dunfermline, with friends, including ladies, drove to Charlestown, where the inhabitants had assembled in Queen's Hall. There was a crowded assemblage, over which Provost Macbeth, of Dunfermline, presided. When the proceedings began, the hall was very dimly lighted by a number of paraffin oil-lamps. Provost Macbeth, without preface, on behalf of the Provost, Magistrates, and Town Council of the City of Dunfermline, presented Lady Veronica Bruce with a silver key; and in order that they might have more light for the proceedings, he asked her Ladyship to turn on the gas. Her Ladyship, in company with Councillor Stewart, the Convener of the Gas Committee, left the hall and turned on the gas at the meter. Returning to the hall, her Ladyship lighted the inverted incandescent gas-lamps overhanging the platform. Gasaliers carrying eight lamps were also lighted. At the request of Provost Macbeth, Lord Bruce went outside and turned on the gas supply to the public lamps.

Provost Macbeth proposed a vote of thanks to Lady Veronica Bruce, which was acknowledged by the Earl of Elgin. Mr. A. Forbes, on behalf of the community, proposed a vote of thanks to the Earl of Elgin for the part he had taken in connection with the gas scheme. Their dwellings had been furnished by his Lordship with the necessary fittings free of expense to any of them, which made the introduction of gas all the more acceptable to them. The success of the scheme was largely due to the support which Lord Elgin had given to it; and he was certain that he expressed the sentiments of all of them when he said that they fully appreciated this renewed token of his Lordship's liberality, and of his untiring solicitude for everything which pertained to the welfare of the community. The Earl of Elgin, in reply, expressed himself as exceedingly delighted to be present, because it gave him the opportunity to notify his admiration of the energy, enterprise, and despatch which had been shown by the Corporation in bringing in the gas. He wondered how many of them knew that this was not the first offer of gas which had been made to the community. In 1870, they introduced gas into Broomhall House; and before they installed it, they consulted the community to know whether they would desire to share in its advantages. But the answer was that they did not want gas. They said, for one thing, that in the dark nights it was desirable that people should go to bed. He did not treat the opinion of that day with disrespect; but it was not the opinion at the present time, otherwise they would not have had the illumination they had

that night. It gave him great pleasure to take steps to ensure that this installation of gas should be available to all the inhabitants of Charlestown. He did not succeed in 1870; but he was glad that he had had a share in the success of 1908, although, of course, he admitted that the success was mainly due to the most energetic Chairman of the Dunfermline Gas Committee. They were that evening to have some instruction with regard to the use of gas for cooking. He ventured to think that the inhabitants of Charlestown would, perhaps, derive as much benefit from this application of gas as from lighting. He hoped the installation would be a success.

Mr. Cooper proposed a vote of thanks to Lord Bruce for his efforts as a county councillor, in the matter of introducing the gas supply. In replying, Lord Bruce mentioned the circumstances which led up to their approaching the Dunfermline Corporation for a supply of gas. The Corporation came to their aid, and, as they saw that night, through the great energy of the Gas Convener, and of their very able Gas Manager—Mr. Waddell—they had succeeded in bringing the gas there. He asked them to accord a hearty vote of thanks to the Convener and the Manager. Councillor Stewart considered that anything in the way of praise in this matter must go to Mr. Waddell. What he was delighted with was the efficiency of the scheme; and what Mr. Waddell would be proud of was that the same thing had not been done in any other part of the world. It was not new to carry high-pressure gas as many tons as they had miles there; but the great thing Mr. Waddell had mastered was that, without any supervision, the pressure at the south-west end of the main regulated the running of the engine at the other end. But for this, they would have required two sets of men—one for day and the other for night—at both ends of the pipe. The arrangement they had worked automatically; and it seemed to him to be perfect. When the scheme was gone into, the probable cost was given at £2490. The actual payments had been £2672; but this included Mr. Waddell's scheme for regulating the pressure, which cost about £250. If they had laid a larger main, at four times the cost, and supplied gas at holder pressure, it would not have been so convenient for consumers as the scheme they had adopted, as at that distance the pressure would not have been suitable for incandescent lighting. The maximum price of the gas was to be 4s. 6d. per 1000 cubic feet, which was less than was charged in most of the towns in the neighbourhood; and he believed that in a few years it would be down to under 4s.

A vote of thanks to Provost Macbeth brought the ceremony to a close.

Miss B. S. Carlow, of Stirling, daughter of the late Mr. R. S. Carlow, then delivered a most interesting illustrated lecture on cooking by gas, using the appliances of Messrs. Fletcher, Russell, and Co., Limited. The lecture was given again on Thursday, on which day also a number of Mr. Waddell's colleagues visited Dunfermline and Charlestown, and had the working of Mr. Waddell's scheme explained to them. At one end of the hall Mr. Waddell had a display of the lighting appliances of various makers.

The Newcastle-upon-Tyne and Gateshead Gas Company have promised to give 50 tons of coke for the benefit of the unemployed.

GAS POISONING CASES.

A bricksetter's labourer named Abraham Townsend, living in Ardwick, Manchester, was found dead in his house one morning last week, having committed suicide by inhaling gas. According to the evidence given at the inquest, Townsend placed his head in the gas-stove and turned on the gas. To further his purpose, he had wrapped his head in clothing, evidently to prevent the fumes from escaping. He had been drinking heavily, and had made the observation to his wife, "Never be surprised if you find me with my head in the gas-stove." Townsend had served in the war in South Africa, and while out there suffered from fever. The usual verdict was returned.

A well-known Stockport newsagent, Mr. Samuel Proctor, was recently found dead early in the morning at his house, and the room was full of gas. He was sitting near the gas-stove, leaning with his face against the tap of the stove, the gas being full on. At the inquest, Dr. Hoyle deposed that death was due to gas poisoning. It was possible, he said, for Proctor to have been poisoned without having had the gas-pipe in his mouth. The policeman who was called in by Mrs. Proctor when she discovered her husband dead, expressed the opinion that the man could have fallen against the gas-tap of the stove while he was asleep. Mrs. Proctor said that when she retired to bed her husband was downstairs. About a quarter-past three next morning she awoke to find that her husband had not been to bed. On proceeding to the kitchen she discovered him as described, and at once raised an alarm. An open verdict was returned.

FOG AND GAS CONSUMPTION.

The prevalence of fog in Manchester on several days during the past two or three weeks did not, it appears, make very much difference in the consumption of gas as compared with the records of twelve months ago. The returns for the weeks which ended Nov. 26 and Dec. 3 are as follows: First week, 139,777,000 cubic feet (corresponding week of last year, 154,923,000 cubic feet); second week, 157,590,000 cubic feet (corresponding week, 159,798,000 cubic feet). It seems that there was quite as much, and perhaps even more, fog last year at this time; for the consumption twelve months ago for each of the weeks mentioned was in excess of what it was this year—15,146,000 cubic feet in the first case, and 2,208,000 cubic feet in the second. Depression in trade has, of course, had something to do with the decline in the figures for this year.

The recent fog caused a considerable increase in the consumption of gas in Rochdale, according to figures sent to a local paper by Mr. T. Banbury Ball, the Corporation Gas Engineer. The figures for the weeks ending Nov. 28 and Dec. 5, 1907, were 17,750,000 and 17,798,000 cubic feet respectively; whereas in the corresponding weeks this year they were 16,340,000 and 18,107,000 cubic feet.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 754.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 15	10	Alliance & Dublin 10 p.c.	18 –18¼	..	5 8 1
268,324	10	,,	7	Do. 7 p.c.	12¾–13½	..	5 5 8
310,000	Stk.	July 15	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
200,000	5	Oct. 29	6¼	Bombay, Ltd.	⅝–⅝	..	5 10 8
40,000	5	,,	6¾	Do. New, £4 paid	¾–1⅛	..	6 6 1
50,000	10	Aug. 27	14	Bourne-	10 p.c.	20–30	..	4 13 4
51,810	10	,,	7	mouth Gas	B 7 p.c.	16½–17	..	4 2 4
53,200	10	,,	6	and Water	Pref. 6 p.c.	15½–16½	..	3 13 10
380,000	Stk.	Aug. 13	12½	Brentford Consolidated	245–248	..	5 0 10
300,000	,,	,,	9¾	Do. New	187–190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	100–102*	..	3 18 5
220,000	Stk.	Sep. 11	10¾	Brighton & Hove Orig.	208–211	..	5 1 10
246,320	,,	,,	7¾	Do. A. Ord. Stk.	152–155	..	5 0 0
450,000	20	Oct. 15	10	British	42½–43½	..	4 11 11
109,000	Stk.	Aug. 27	6	Bromley, Ord. 5 p.c.	114–116	..	5 3 [illegible]
165,700	,,	,,	4½	Do. do. 3½ p.c.	84–86	..	5 4 8
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	11¼–11⅝	+⅛	5 19 2
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb.	92–94*	+1	4 5 1
150,000	20	July 15	7½	Cagliari, Ltd.	25½–26½	..	5 9 5
100,000	10	—	—	Cape Town & Dis., Ltd.	4⅜–⅝	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	5–6	..	7 10 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	47–49	..	6 2 5
100,000	Stk.	D. c. 1	4½	Do. 4½ p.c. Deb. Stk.	78–80	..	5 12 6
157,150	Stk.	Aug. 13	5	Chester 5 p.c. Ord.	109½–111½	+1	4 9 8
1,493,280	Stk.	Aug. 27	5⅞	Commercial 4 p.c Stk.	106–108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105	..	4 15 3
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	81–83*	+⅛	3 12 3
820,000	Stk.	,,	6¼	Continental Union, Ltd.	105–108*	..	6 0 4
200,000	,,	,,	7	Do. 7 p.c. Pref.	137–140*	+1	5 0 0
460,170	Stk.	—	5	Derby Con. Stk.	122–124	..	4 0 8
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
148,995	,,	Sep. 30	5	East Hull 5 p.c. Ord.	93–100	..	5 0 0
486,090	10	July 15	12	European, Ltd.	23½–24	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	17¼–17⅝	+⅛	5 1 4
15,182,590	Stk.	Aug 13	4/16/8	Gas-	4 p.c. Ord.	100–101	..	4 9 9
2,600,000	,,	,,	3½	light	3½ p.c. max.	89–90	..	3 17 9
3,799,735	,,	,,	4	and	4 p.c. Con. Pref.	106–107	..	3 14 9
4,193,975	,,	Dec. 11	3	Coke	3 p.c. Con. Deb.	84–85*	..	3 10 7
258,740	Stk.	Sep. 11	4½	Hastings & St. L. 3½ p.c.		95–97	..	4 17 11
82,500	,,	,,	6¾	Do. do. 5 p.c.		113–115	..	5 8 [illegible]
70,000	10	Oct 15	1	Hongkong & China. Ltd.		18–18½	..	5 18 11
123,700	Stk.	Sep. 11	6½	Ilford "A" and "C"		131–133	..	4 17 9
65,580	,,	,,	5	Do. "B"		104–105	..	4 15 3
51,000	,,	June 26	4	Do. 4 p.c. deb.		104–106	..	3 15 6
4,940,000	Stk.	Nov. 13	8	Imperial Continental		180–182	..	4 7 11
473,600	Stk.	Aug. 13	3½	Do. 3½ p.c. Deb. Red.		95–97	..	3 12 2
195,242	Stk.	Aug. 27	6	Lea Bridge Ord. 5 p.c.		120–122	..	4 18 4

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Aug. 27	10	Liverpool United A	226–22[illegible]	..	4 7 9
718,100	,,	,,	7	Do. B	165½–167½	–⅛	4 3 7
306,083	,,	June 26	[illegible]	Do. Deb. Stk	106–108	.	3 14 1
75,000	5	Dec. 11	6	Malta & Medn., Ltd.	4⅜–4⅝*	+⅛	6 3 1
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4⅝	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 13	3[illegible]	Monte Video, Ltd.	11½–12	..	5 16 8
1,775,892	Stk.	July 30	4/12/[illegible]	Newc'tle & G'tesh'd Con.	108–110	..	4 4 1
418,460	Stk.	June 26	3½	Do. 3½ p.c. Deb.	92–94	+½	3 14 6
15,000	10	Aug. 27	10	North Middlesex 10 p.c.	20–20½	..	4 17 6
55,940	10	,,	7	Do. 7 p.c.	13½–14	..	5 0 0
300,000	Stk.	Nov. 27	8	Oriental, Ltd,	138–140	+1	5 14 4
60,000	5	Sept. 30	8	Ottoman, Ltd	6½–6⅝	..	6 5 6
31,800	53	Aug. 27	13	Portsea Island A	138–140	..	4 18 6
60,000	50	,,	13	Do. B	132–134	..	4 17 0
100,000	50	,,	12	Do. C	122–124	..	4 16 9
114,800	50	,,	10	Do. D and E	104–106	..	4 14 4
398,490	5	Oct. 29	7	Primitiva Ord.	5⅛–6⅛	..	5 15 6
796,980	5	July 30	5	Do. 5 p.c. Pref.	5⅛–5⅛	..	4 16 5
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
1,000,000	10	Oct 15	8	River Plate Ord.	13–13½	+⅛	5 18 6
312,650	Stk.	June 26	4	Do. 4 p.c. Deb.	94–56	+1	4 3 4
250,000	10	Sept. 30	8	San Paulo, Ltd.	4–14¼	..	5 12 3
125,000	50	July 1	5	Do. 5 p.c. Deb.	50–51	..	4 18 0
135,000	Stk.	Sept. 11	10	Sheffield A	240–242	..	4 2 8
209,984	,,	,,	10	Do. B	240–242	..	4 2 8
523,500	,,	,,	10	Do. C	240–242	..	4 2 8
70,000	10	Oct. 29	10	South African	13–13½	..	7 8 2
6,429,895	Stk.	Aug. 13	5/6/8	South Met., 4 p.c. Ord.	119½–120½	..	4 8 6
1,895,445	,,	July 15	3	Do. 3 p.c. Deb.	85½–86½	..	3 9 4
209 825	Stk	Aug. 31	8	South Shields Con. Stk.	153–155	..	5 3 3
95,000	Stk.	Aug. 13	5/6/8	S'th Suburb'n Ord. 5 p.c.	117–119	..	4 9 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	121–123	..	4 1 4
117,058	,,	July 15	5	Do. 5 p.c. Deb. Stk.	124–126	..	3 19 4
502,310	Stk.	Nov. 13	5	Southampton Ord.	107–110	..	4 11 9
120,000	Stk.	Aug. 13	6¾	Tottenham A 5 p.c.	134–136	..	4 19 3
398,940	,,	,,	5¼	and B 3½ p.c.	106–108	..	4 17 3
149,470	,,	June 26	4	Edmonton 4 p.c. Deb.	102–104	.	3 16 11
182,380	10	June 12	8	Tuscan, Ltd.	9⅞–10	–⅛	8 0 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100–101	..	4 19 0
193,742	Stk.	Aug. 27	5	Tynemouth 5 p.c. max.	106–108	..	4 12 7
255,636	Stk.	Aug. 27	6¾	Wandsworth B 3½ p.c.	128–130	..	5 0 0
79,416	,,	June 26	3	and 3 p.c. Deb. Stk.	74–76	..	3 18 11
				Putney			
845,872	,,	Aug. 27	5⅛	West Ham 5 p.c. Ord.	106–108	..	4 14 11
185,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
228,300	,,	June 26	4	Do. 4 p.c. Deb. Stk.	104–106	..	3 15 6

Prices marked * are "Ex div."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

In the Glasgow Town Council on Thursday, the Parliamentary Bills Committee reported as to the recent interview with the Secretary for Scotland and the Lord Advocate regarding the valuation of tramway lines and gas and water undertakings. Mr. Pratt said he regretted that the deputation did not get much encouragement. He asked the Convener of the Committee to consider whether it would not be better, until the Government were prepared to put the burghs and counties on the same basis, to get the law altered so that in Glasgow these subjects would be assessed on their full valuation, as was done in the county. He had not been able to ascertain in exact figures what would be the result if the basis of assessment in Glasgow were the same as in the county, yet he learned that these subjects at present paid in municipal assessments above £80,000, whereas if they were assessed on the same basis as in the county they would pay, in municipal assessments, £125,000. The difference, estimated at about £45,000, which would be received by the Corporation, would enable them to give an immediate reduction in the taxes of about 2d. in the pound. Mr. W. F. Anderson remarked that while the Corporation were only charged upon one-fourth of the rateable value, they had to pay upon a full valuation in the counties, and in some of the counties they paid two-thirds of the whole rates. He moved that the minute be recommitted. Treasurer Graham said that not 10 per cent. of the burghs in Scotland were in favour of the contention of Glasgow. Ninety per cent. of the burghs were in favour of an alteration in the system of rating; not a levelling-down to one-fourth, but a levelling-up, so that the assessments would be put on the full value. The time had come when there should be an alteration upon the system of local taxation and valuation; and the Government had practically promised to bring in a Bill on the subject. The report of the Committee was adopted, on a division.

The Glasgow Town Council on Wednesday, at a special meeting, took up consideration of the subject of the charge for the lighting of private streets and courts and common stairs, to which I referred last week. Mr. M'Millan moved that the charge upon proprietors for the lighting of private streets and courts be 40s., instead of the 25s. recommended by the Committee. Mr. W. F. Anderson reminded the Council that Parliament would only proceed by stages; and he thought the present was a fair step for relieving gas consumers of the large loss which they sustained in the lighting of private streets and courts at the present time. By 30 votes to 4, the proposal of the Committee was carried. Mr. Alston moved disapproval of the proposal to increase the cost of lighting common stairs to tenants from 10s. to 20s. It was explained on behalf of the Committee that the actual cost to the Watching and Lighting Committee was 15s. 9d. per lamp, while they charged only 10s.; and their desire was to improve the quality of the lighting. The proposal of the Committee was approved by 23 votes to 8. Mr. King moved rejection of a recommendation by the Committee which proposed the reduction of the proportion of the charge retained by landlords in respect of the collection of the charge from their tenants, from 20 to 10 per cent. Mr. M'Millan moved that 2½ per cent. be the discount allowed to landlords. By 20 votes to 9, Mr. King's motion was defeated.

It was a very interesting ceremony which was carried through at Charlestown on Wednesday evening, when the daughter and the son of the Earl of Elgin respectively turned on the private and the public lighting of the town. A gas-lighted town without gas-works is not a novelty; but there is a novelty in the case of Charlestown and Limekilns, which is described in the report of the proceedings appearing on p. 779. There can be no question as to the efficiency of the lighting; and if the scheme continues to work with the smoothness which it did on Wednesday, unbiassed inquirers will only have to consider the cost. To the consumers the cost is quite reasonable; being only 4s. 6d. per 1000 cubic feet, which, as was pointed out, is lower than gas is supplied at in many Fife towns. It certainly said a very great deal for Mr. Waddell's belief in the perfection of his scheme that he did not have a trial of it before the actual process of inauguration, and that he invited a number of his brother gas managers to visit the place the next day, to see the installation at work; and the result justified his belief. It is too early yet to say how the scheme will work out in various ways. This can only be ascertained in time; but that the scheme is a workable one was fully demonstrated on Wednesday evening. If it does turn out as expected, a great advance will have been made in the solution of the problem of how to economically supply gas to outlying districts.

Sir Charles H. Dundas, Bart., who had been for a good many years Chairman of the Comrie Gaslight Company, died the other day, and on Tuesday evening the Directors appointed Mr. P. Macintyre, of Tighnablair, his successor. Sir Charles took a great interest in the affairs of the Company.

Mr. R. Cockburn Millar, C.A., of Edinburgh, Auditor for the burgh of Kirkcaldy, has been asked by the Town Council of Kirkcaldy to report in regard to the probable financial results of the purchase by the town of the Gas Company's undertaking.

On Tuesday, Mr. H. Richardson, Electrical Engineer to the Corporation of Dundee, submitted to a Committee of the Council a scheme for the lighting of common stairs in the city by means of electricity. The Town Clerk said that the question of stair lighting, if taken up by the Electricity Department, could only be done by agreement. The Gas Department had powers to compel owners, at their own expense, to provide gas-fittings and gas. Mr. Richardson said the system suggested by him would be very useful, and would settle the threefold problem between the police, owners, and tenants as to stair lighting. Under it they could beat gas or any other illuminant, and could control the lighting and extinction, so that all trouble surrounding these at present would be avoided. Mr. Girrity moved that the scheme be adopted under a system whereby the Department should carry out and spend

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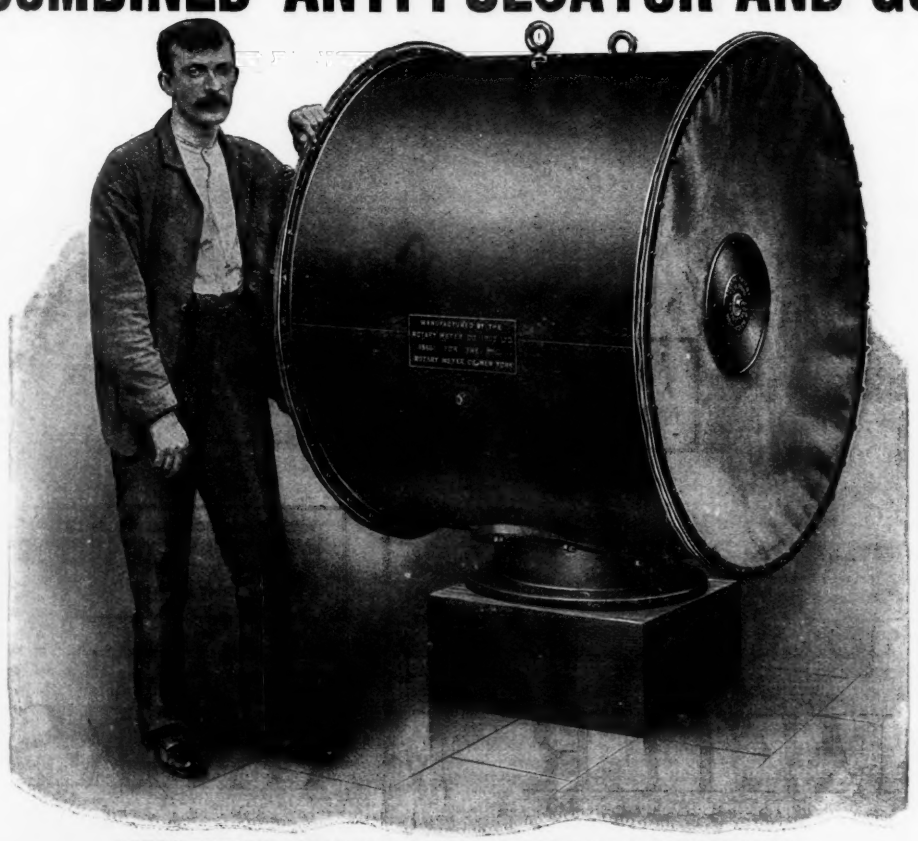

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money on the construction of all installations of stair and close lighting, and charge the owners of properties so treated an annual sum to cover the interest on the capital so expended, such annual sum to be in addition to the amount charged by the Department for current and controlling the switching on and off of the current. In reply to a question, the Engineer stated that the scheme would not be compulsory, and would only be introduced where proprietors desired it. Mr. Speed said: "What about the Gas Department?" Mr. A. Yuill, the Gas Engineer, suggested that he should submit a report on the matter. Mr. Richardson said he had been working at the scheme for a long time, and asked why he should be baulked by reports. There were possibilities of the Electricity Department getting business which was undertaken by the Gas Department, and which they did not now touch at all. Why should he not be allowed to go on with his scheme, and provide the light for house factors who wanted electricity and did not want gas? Mr. Girrity's motion was thereupon adopted, and the scheme sent on to the Town Council.

An explosion of gas occurred on Thursday evening in a house in High Street, Musselburgh, occupied by Lewis Thomas. Mrs. Thomas had gone to bed, feeling ill from the effects of gas fumes in the house. Her husband started to search for the escape of gas with a lighted candle. By the explosion which ensued, a window in the hall was blown out, fragments of the woodwork being carried a considerable distance. The front door was burst open, and a back window shattered. Thomas was burned a good deal.

Exmouth Water Supply.—At the meeting last Wednesday of the Exmouth Urban District Council, a report was received from Messrs. G. H. Hill and Sons, the Engineers, with reference to the scheme which the Council are promoting for augmenting the water supply. It was stated therein that the principal works were a borehole and pumping-station, a well with adits, and piping between the borehole and reservoirs. The estimated cost was £38,000; but the Engineers were not in a position to say definitely what would be the depth of the borehole, whether or not it would render necessary a well with adits, nor what their depth and length would be. They had assumed a depth of 400 feet, or 100 feet deeper than the present boring. Should the well and adits prove unnecessary, the estimate would be reduced about £6000. The work of laying pipes from the Squabmoor reservoir might possibly be deferred for a few years, and the cost (£9000) thus postponed. It was understood that the Surveyor desired £5000 to be added to cover the cost of new mains, &c. Mr. Harris, in moving the adoption of the report, said Parliament would be asked to grant a period of fifty years for the repayment of the money expended on the works, and sixty years for the cost of the land. Portions of the work were to be completed in seven years, and the last part in fifteen years. It was decided that application should be made to Parliament in the ensuing session, and the costs charged upon the district fund and the general district rate.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Dec.* 12.

There has been a fair amount of demand during the week, but supplies have been plentiful, and prices have again been in favour of buyers. The closing quotations are, consequently, £10 17s. 6d. per ton f.o.b. Hull, £10 18s. 9d. per ton f.o.b. Liverpool, and £11 1s. 3d. per ton f.o.b. Leith. In the forward position, there has been some selling for 1909 delivery at a moderate premium upon prompt prices. There has also been a considerable amount of speculative offering abroad, for delivery over the spring months, at about the level of prices current for December delivery.

Nitrate of Soda.

This article is quiet on spot at 9s. 7½d. per cwt. for 95 per cent. and 9s. 10½d. for refined quality, less 2½ per cent. discount.

Tar Products. LONDON, *Dec.* 14.

Markets have been quiet throughout the past week; and it does not appear likely that there will be any revival in business before the New Year. Pitch is depressed, and prices have a downward tendency. There does not seem to be any actual London stuff offering at the moment; but it is doubtful whether anything over 18s. 6d. to 19s. can be obtained, seeing that business has been done on the east coast for January-June delivery at 18s. 3d. On the west coast, Manchester and Liverpool appear to be fairly well sold, and nothing of importance is reported from these places. A fair amount of business has been done at outside ports upon the west coast at 17s. 6d. to 17s. 9d. f.o.b. On the Continent, there are sellers at equal to 18s. 9d. f.o.b. England for delivery over next year; while in South Wales, very low figures have been accepted for January-June and July-December delivery. Creosote continues firm, and it is still possible to buy for prompt delivery in London at 2¾d. per gallon; but not the best makes, as the manufacturers of these are well sold, and are not prepared to consider business except at very good figures. In the Midlands, the market continues steady, and the price is about 2¾d. In the Yorkshire district, 2¾d. is reported to have been paid for delivery over the first six months of next year; but in Manchester it is stated that oil has been offered and declined at 2¾d. *ex* makers' works. In the Liverpool district, some quantity of salty oil is reported to have been sold at 2¼d. Benzol, 90 per cent., is quiet, and business has been done at 6d. for prompt delivery. Benzol, 50 to 90 per cent., is steady; while there is a fair demand for toluol for delivery over next year. Solvent naphtha is steady, and business has been done in actual London makes at 11½d.; but under this figure has been accepted for the country quality. Carbolic acid is very dull, and Continental makers report having bought freely at east coast ports at 1s. Naphthalene is depressed; while salts are not easy to sell. Tar is feeling the effects of the fall in the price of pitch.

The average values during the week were: Tar, 11s. to 15s., *ex* works.

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GAS METER MAKERS.

Pitch, London, 18s. 6d. to 19s.; east coast, 18s. to 18s. 3d.; west coast, 17s. 3d. to 18s. 3d. f.a.s. Mersey; 17s. 3d. to 17s. 9d. f.o.b. others. Benzol, 90 per cent., casks included, London, 6⅞d. to 7d.; North, 6d. to 6¼d.; 50-90 per cent., London, 7⅛d. to 7⅜d.; North, 7d. to 7¼d. Toluol, casks included, London and North, 9d. to 9⅛d.; Crude naphtha, in bulk, London, 3⅜d. to 4d.; North, 3½d. to 3¾d.; solvent naphtha, casks included, London, 11d. to 11⅛d.; North, 10d. to 10⅛d.; heavy naphtha, casks included, London, 11d. to 11⅛d.; North, 10d. to 10⅛d. Creosote, in bulk, London, 2⅜d. to 2⅝d.; North, 2⅝d. to 2¾d. Heavy oils, in bulk, 3d. to 3⅛d. Carbolic acid, 60 per cent., casks included, east coast, 1s. to 1s. 0¼d.; west coast, 11⅜d. to 1s. Naphthalene, £3 10s. to £6 10s.; salts, 32s. 6d. to 35s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been quiet throughout the past week, and there is little or no business doing. The Gas Companies are still asking high prices; but the outside makes can be secured upon Beckton terms at £10 15s. In Hull, £10 17s. 6d. has been accepted; while in Liverpool business has been done at £10 18s. 9d. to £11. In Leith, £11 2s. 6d. is asked; but it is doubtful whether this figure can be obtained.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a rather better demand for some classes of coal, and the shipments are heavier generally, as is frequently the case before the great holidays. In the steam coal trade, best Northumbrian steams are quoted from 10s. 4½d. to 10s. 6d. per ton f.o.b., second-class steams from about 9s. 6d. to 10s., and steam smalls from 4s. 6d. to 6s. The production is about an average, and it is quite probable that there may be the usual large output for the next few days. In the gas coal trade, there has been a strong demand. With steamers more plentiful, the shipments have been remarkably full—both to the south country gas companies and also to some foreign countries—and these heavy shipments will continue, with the interruption of the holidays. Durham gas coals vary in price from about 9s. to 10s. per ton f.o.b. for the usual qualities, with a quotation of about 10s. 9d. for special classes. As to contracts, not much is doing at present; but there are inquiries for good quantities of gas coals for the Mediterranean ports for next year. It is believed that tenders have been accepted for the coal for Bergen (Norway)—some 10,000 tons of best Durham gas coals. The general idea is that the price will be equal to 9s. 10d. per ton f.o.b. Coke is steady; but the abundance of gas coke makes its price easy—from 14s. to 14s. 3d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Trade does not show any improvement. The demand for export is poor, and there is difficulty in disposing of outputs. The only small sorts which are moving off freely are treble and double nuts. Other kinds are stiff to sell. The prices quoted are: Ell 9s. 9d. to 10s. 9d., splint 10s. 6d. to 10s. 9d., and steam 10s. to 10s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 292,421 tons—an increase of 26,412 tons upon the preceding week, and of 10,283 tons upon the corresponding week of last year. For the year to date, the total shipments have been 13,733,268 tons—a decrease of 159,654 tons upon the corresponding period.

NEW CATALOGUES, &c.

"Inexpensive and Artistic Gas-Fittings" is the title of a profusely illustrated booklet just prepared by Messrs. James Milne and Son, Limited, of No. 59, Farringdon Road, E.C. It is in a concise form, convenient for the pocket; and, in addition to the examples of attractive gas-fittings which are procurable at a low cost, it contains particulars of some of the accessories in use for up-to-date lighting. The title of the pamphlet is justified by the contents; and its careful perusal should therefore be assured.

The Wigan Coal and Iron Company (through Mr. A. C. Scrivener) forward a copy of a newly issued book dealing with their collieries, works, and products. It is beautifully got up, and printed on art paper, which gives an excellent appearance to the many photographic illustrations by which it is embellished. The principal works of the Company are at and near Wigan, at Bold, near St. Helens, and at Manton, near Worksop. They comprise extensive collieries; establishments for the manufacture of coke and the recovery of bye-products; smelting furnaces for the production of various materials; steel works and rolling-mills; flag works, for the manufacture of concrete flags; macadam, concrete, and tar macadam works; brick-works; and lime-kilns. It will thus be seen that plenty of material exists for the preparation of an interesting story; and this has been taken full advantage of. Beginning with analyses of the cannel and gas coal—made respectively by Mr. William King and Mr. Edward Allen—the reader is taken over the various processes carried on by the Company; while the main features of some of the coal-pits are described and illustrated. Not the least interesting feature of the book is a short general account of the undertaking, from which we learn that the Company employ over 11,000 hands, and have upwards of 6200 waggons and 27 locomotive engines.

The public examination of Mr. S. J. H. Willey was held at the London Bankruptcy Court last Tuesday, before Mr. Registrar Linklater. The particulars as to the debtor's affairs, which have already been given (see *ante*, p. 570), were submitted to the Official Receiver, and it was stated that an offer of 6s. 8d. in the pound had been made and declined. The examination closed.

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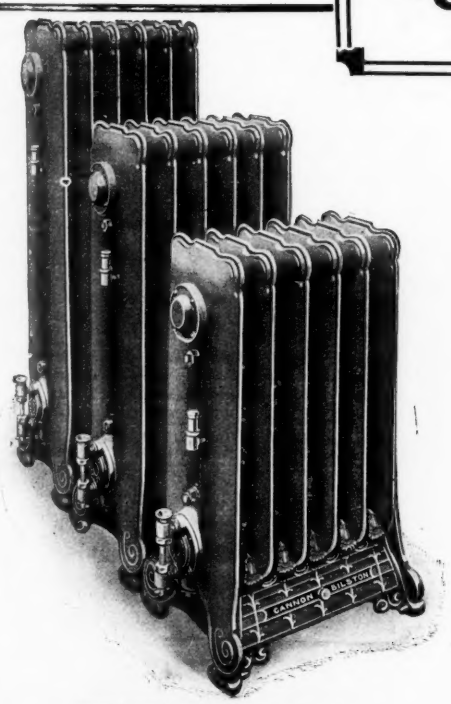

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Sales of Stocks and Shares.

There was a large attendance at a public auction held at the offices of the Derby Gas Company last Wednesday, when £10,000 of ordinary consolidated stock was offered for sale in lots of £100 each. Bidding throughout was keen; and the prices realized ranged from £122 5s. to £123 15s. per lot, with the exception of the last, for which the unusually high price of £125 was obtained. The sale produced £12,333. On the same day, Messrs. Charles Butters and Sons offered for sale by auction at the North Stafford Hotel, Stoke-on-Trent, in lots of £100, so much consolidated new ordinary stock of the Staffordshire Potteries Water-Works Company as would raise £6110 10s.; and so much 3½ per cent. perpetual debenture stock as would raise £2100. For the new ordinary stock the highest price realized was £177 10s.—the average being £177. All the debenture stock was disposed of at par.

Mr. Whatmough on "The Poor Man's Light."

At Heywood, last Tuesday, Mr. Walter Whatmough, the Corporation Gas Engineer, delivered an interesting popular lecture bearing the title of "The Poor Man's Light." Going from oil and candles to gas, he touched on the numerous processes of making; and then he dealt with the uses of gas, in connection with which many useful hints to consumers were thrown out—particularly in regard to the proper treatment of incandescent mantles and burners. Mr. Whatmough stated that there are to-day, it had been said, over 2,000,000 gas-stoves in use in the United Kingdom; while more than 120,000 gas-engines are at work. The hygienic value of gas and its advantages for street lighting were usefully set forth; and, in conclusion, the lecturer submitted the following figures illustrative of twenty years' progress in the gas industry:—

	Number of Authorized Undertakings.	Number of Consumers.	Capital Invested. £
1886.	539 ..	2,130,377 ..	56,362,902
1896.	641 ..	2,845,728 ..	75,243,361
1906.	763 ..	5,363,533 ..	126,565,460

The lecture was accompanied by lantern slides; and at its close a hearty vote of thanks was passed to Mr. Whatmough.

Gas Profits at Malvern: A Correction.—In the article on "Malvern Gas Supply" in the last number of the "JOURNAL," it should have been stated that, though the coal carbonized in the past financial year had cost £1100 more than in 1907, "the profit per 1000 cubic feet was only 0·5d. [not 5d.] less."

Crewkerne District Council and the Water-Works.—A communication has been received by the Crewkerne Urban District Council from the Local Government Board to the effect that the latter body refused to sanction the application of the Council to raise a loan in connection with the proposed purchase of the Water Company's undertaking; the price (£15,500) being considered by the Board as an excessive one.

Loughborough Gas Undertaking.—At the meeting of the Loughborough Town Council on Monday last week, the statement of accounts of the gas undertaking for the half year ending the 30th of September were presented. The revenue was £8034, and the expenditure £6472; leaving a balance of £1562 to be carried to the profit and loss account. It was stated the balance in the corresponding period of last year was £1867—a difference of more than £300.

Electricity Supply in the City.—According to the "City Press," a movement is on foot to invite another electric supply company to compete with the two existing undertakings in the City. It has been explained to our contemporary that the movers in the matter fear a rise in the cost by the linking-up proposals now being discussed. On the other hand, it is pointed out that no Bill could be dealt with in the present session; while it must be remembered that the Corporation have the right to purchase the Charing Cross Company's City undertaking in 1914.

Charge for Water for Baths at Rochdale.—At the meeting of the Rochdale Town Council last Thursday, the Water Committee submitted in their minutes a new scale of charges for bath water in houses of £8 rateable value and under. The present charge is 2s.; and it was proposed to reduce it to 1s. The Chairman of the Committee (Alderman W. T. Heap), in moving the adoption of the minutes, said the Committee were very desirous of supplying water free for baths; but their revenue would not permit it. Mr. Wilkinson moved, as an amendment, that bath water should be supplied free to houses of the class in question; but it was lost by 9 votes to 27, and the minutes were passed.

West Greenwich Gas-Works Institute.—The annual dinner in connection with the Institute was held last Saturday—Mr. J. F. Braidwood, Engineer-in-Charge at the West Greenwich station of the South Metropolitan Gas Company, in the chair. There were about 150 present; among the guests being Mr. F. M'Leod, the Secretary of the Company; Messrs. H. Austin, W. Cupitt, and C. T. Drumgold, Directors; Messrs. P. Richbell, H. Day, J. D. C. Hunter, J. White, N. S. Braidwood, W. T. Layton, and Dr. Corfe, officers. Eleven of the oldest servants of the Company attended the dinner, and each received a pipe and a packet of tobacco. After the loyal toast had been honoured, that of "The South Metropolitan Gas Company" was proposed by the Chairman and responded to by Mr. Austin; the other toasts being "The Chairman" and "The Press"—the latter acknowledged by Mr. W. T. Layton, the Editor of the Company's "Co-Partnership Journal." The toasts were interspersed with songs. A feature of the proceedings was the presentation of the Institute's prizes for flowers and vegetables, indoor games, and cricket. All the arrangements connected with the dinner were carried out by the men themselves; and it was prepared and served by Mr. J. J. Spreadborough, the caretaker at the Institute. The floral decorations of the room were furnished by Mr. E. E. Barton. The Institute is managed by a Committee, of which Mr. W. Weatherall is the Chairman, Mr. Alfred Showell the Hon. Secretary, and Mr. H. P. Hollis the Assistant Hon. Secretary.

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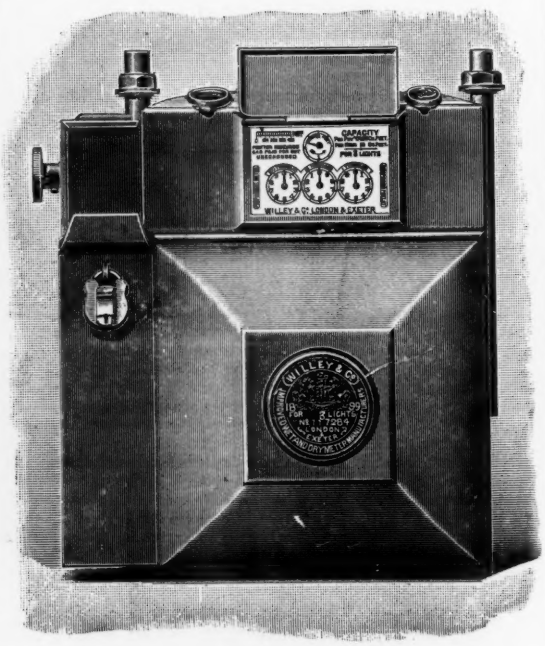

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Gas v. Electricity for Workhouse Lighting.

The St. Pancras Board of Guardians, having received a letter from the Local Government Board inquiring if they had considered whether any alteration and improvement could be made on the present system of gas lighting at the workhouse, by means of which the consumption of gas could be reduced and the lighting improved, have resolved to introduce incandescent gas lighting. The test which this system underwent indicated a consumption of 12 cubic feet of gas per hour with a greatly improved light, compared with 32 cubic feet per hour, the quantity at present consumed. The new installation is to cost £124; but it is expected that a saving of 3165 cubic feet of gas per hour will be effected—representiug about £300 per annum. There was some opposition when the matter was discussed by the Board on the 10th inst., and it was suggested that electricity should be tried. In answer to this, Mr. Lloyd-Taylor, the Chairman of the Works Committee, said the master of the workhouse had experimented with the incandescent system of gas lighting, and had proved its efficiency and economy. It was the same as that in operation at the Victoria and Broad Street Railway Stations. Mr. Washington said he had examined the system referred to, and found that where they now used eight lights, it would only be necessary to have four. Major Munday also supported the recommendation, and assured the Board that it would effect a saving of from £200 to £300 per annum. Mr. Lloyd-Taylor said the cost of an electric installation would be about £2000, independent of the infirmary; while, on the other hand, this system of incandescent lighting would save £200 in the first year, and a greater amount each subsequent year. It was resolved by a large majority to instal the system.

Reductions in Price.—The Directors of the Brighton and Hove Gas Company have resolved that, as from the 1st prox., the prices charged for gas throughout their district to consumers by ordinary meters shall be reduced by 1d. per 1000 cubic feet. The Bridgnorth Town Council, at their meeting last Tuesday, adopted a recommendation by the Gas Committee to reduce the price of gas 3d. per 1000 cubic feet; bringing it down to the lowest figure ever charged in the town.

Gas for Sabden.—In a paragraph headed "Behind the Times at Sabden," which appeared in the "JOURNAL" for the 3rd ult. (p. 365), it was stated that a proposal had been made to Sabden by the Padiham Urban District Council to supply the village with gas, for which powers have lately been obtained; and the Council's Gas Engineer and Manager (Mr. A. J. Harrison) was requested to prepare estimates of the cost of pipes and fittings for the different classes of houses, to be submitted to the owners of property. This was accordingly done, and the Council's offer to supply gas at the rate of 4s. 3d. per 1000 cubic feet has been accepted.

Prepayment Meters at Southport.—The Gas Engineer to the Southport Corporation (Mr. John Bond) has presented his annual report as to the gas supplied through prepayment meters. He states that the system was introduced in 1898, and at the end of that financial year the number of these meters fixed was 501; the average quantity of gas sold per meter being 4629 cubic feet. For the year ended March last, there were on the books 4050 consumers by the system, the average gas consumption amounting to 12,270 cubic feet; showing an increase per meter of 7641 cubic feet. The consumption in 1899 was 2,319,400 cubic feet; while it is now 49,700,700 cubic feet.

Reduced Charges for Gas and Meter Hire at Camborne.—The Directors of the Camborne Gas Company, Limited, have framed a revised scale of charges for gas, and it will come into force on the 1st prox. The gross price will be 4s. 9d. per 1000 cubic feet, subject to the following discounts: When the consumption is less than 5000 cubic feet per quarter, 2d. per 1000 cubic feet; when between 5000 and 10,000 cubic feet, 4d.; when above the latter figure, 6d. For gas used for cooking and heating purposes, an additional discount of 6d. per 1000 cubic feet will be allowed when the supply is through a separate meter. A nominal rent of 1s. per quarter will be made for the hire of this meter; but in the event of the quantity of gas registered by it exceeding 3000 cubic feet per quarter, the rent will be waived. For gas used for power purposes, and for large consumptions, special discounts are allowed. All these discounts are subject to the payment of the account by the end of the month following its date. The Directors have also revised the scale of meter-rents, and made a considerable reduction in the prices hitherto charged. They point out that these concessions have only been made possible by their decision to abolish the collection of the accounts, and inviting prompt payment of their charges at the offices.

Messrs. Mobberley and Perry have secured the contract for supplying the Accrington District Gas and Water Board with a new gas-retort plant at the Board's works in Accrington.

The first statutory meeting of the Tawe Valley Gas Company (incorporated in the present session) was held at Cardiff on the 5th inst., when Colonel Fisher, Colonel James, Messrs. D. & L. Morgan (Cardiff), and J. H. Silcox (Pontardawe) were elected Directors.

The report of the Directors of James Milne and Son, Limited, to be presented at the tenth annual general meeting on Friday, shows that the net profit for the fifteen months ending the 30th of September last was £2075. The Directors have transferred from the special reserve fund £401; making a disposable balance of £2476. From this they recommend the payment of a dividend of 2½ per cent. on the preference shares for the half year ending Dec. 31, 1907 (less income-tax), amounting to £2375; leaving £101 to be carried forward. The Directors remark that, in common with all cognate industries—especially the building trade, with which the Company are very closely connected—the returns have suffered severely through the abnormal depression prevalent during the whole period of trading, and still existing. An application made to the Court of Session for reducing the capital, as approved at the meeting held on the 6th of December last year, was duly granted, and has been carried into effect.

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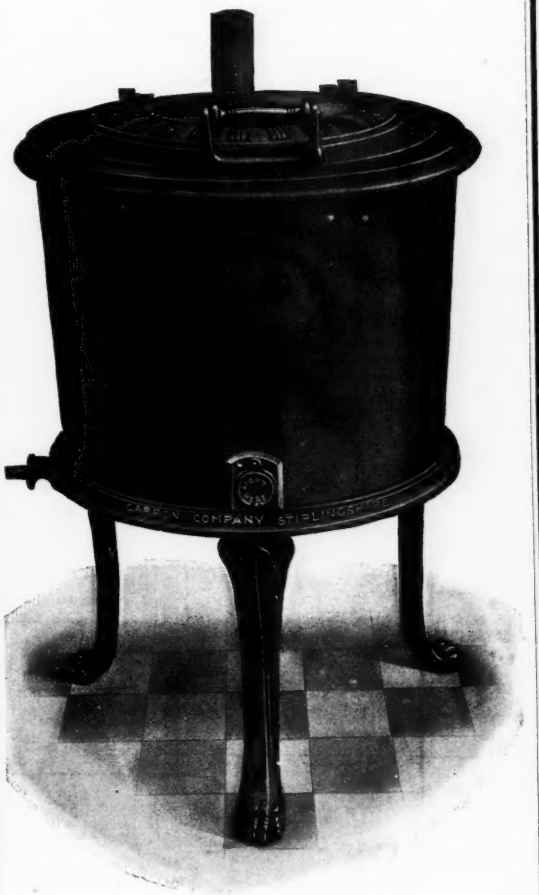

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At the London Bankruptcy Court, last Wednesday, the public examination took place, before Mr. Registrar Giffard, of Mr. Ivan Rhydderch Davies, a commission agent in connection with lighting and other companies, whose failure was referred to in the "JOURNAL" for the 24th ult. (p. 581). The statement of affairs showed gross liabilities amounting to £38,026, of which £12,995 is expected to rank for dividend. A sum of £21,343 is due to partly secured creditors, less the estimated value of the securities, £13,230; making the amount £8113. The assets were put at *nil*, and the deficiency was stated to be £12,995. In the course of his examination by the Senior Official Receiver (Mr. E. L. Hough), the debtor gave particulars of his financial transactions with various companies, to the losses incurred in connection with which he attributed his failure. He said that he was adjudicated a bankrupt in 1895, with liabilities amounting to £1342, and had never applied for his discharge; but all his creditors knew this. The examination was concluded.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

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ENGINEERING DRAUGHTSMAN. Preston Gas Company. Applications by Dec. 23.
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ENFIELD GAS COMPANY. Dec. 31.
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CHORLEY GAS DEPARTMENT. Tenders by Dec. 22.
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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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